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Alfalfa Yield Predictor Tool

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There is a constant need for current and reliable management information about alfalfa production, and increasing interest in growing the crop efficiently with a reduction in resource use. Yield prediction is difficult—not only from one year to the next but also between cuttings in a given year. Being able to estimate yields by simple, physical methods is one step in improving overall understanding of field potential and input efficiency. The purpose of this article is to describe the Alfalfa Yield Predictor, a user-friendly computer model that predicts alfalfa yields based on user-input parameters such as fall dormancy rating, cutting (or general time of year), plant height at time of cutting, growing degree days (GDD), and rainfall, even under irrigation. All of these parameters are valuable tools for assessing potential alfalfa yields. The Yield Predictor was developed from a four-year (1998–2001) dataset generated from a study conducted at the New Mexico State University Agricultural Science Center at Tucumcari. The field trial dataset has 3,072 records, from which the application filters data according to user selections of fall dormancy (FD), cutting, height, GDD, and rainfall. For FD and harvest, users can make selections from drop boxes (See Fig. 1). Users can specify a FD of 2 to 9 and 1 to 6 cuttings corresponding to May through October harvest dates. It is possible to select *All* for these two parameters, meaning that all records on that parameter will be used to calculate the predicted yield. In the cases of height, GDD, and rain, the user needs to select a range between a minimum and a maximum value for each of these parameters. The minimum and the maximum values in the subset selected are presented above the drop box menus as a reference. The box menus have predefined values that the user can select. It is also possible for the user to enter values directly into the drop boxes.

After entering information for these five parameters, the user can click a button to *predict* the yields. The application will then select the appropriate records and display the results in the same screen. We insisted on presenting probabilistic results in order to provide the user with a more complete picture of all the information, to better suit the decision-making process. Probabilistic results help users to make better decisions according to their risk aversion characteristics. For example, for a selection of *FD = 6* and *harvest = 4*, there will be 64 records with an average of 1.59 tons/ac. However, the minimum value could be as low as 1.24 tons/ac and the maximum as high as 2.00 tons/ac. Additional information presented through the exceedance curve allows the user to make these extra decisions. If the user's goal is to produce at least 1.25 tons/ac, the curve indicates that it is a reachable goal; the yield is expected to fall short in only 3% of cases. Similarly, if the user wants to know the probability of producing 1.75 tons/ac or more, the application will respond to that question immediately, indicating that a 1.75 tons/ac yield or more will occur in one of every seven harvests (14% of the time = 100–86%). Figure 1 shows results given if *All* is selected for both FD and Harvest.

Regarding height of plants before harvesting—as expected, taller heights are associated with higher yields. For example, if *All* FD are selected, a mean range of 0.30 ton/ac for heights 10 in. or lower to a mean yield of 1.91 ton/ac for heights above 30 in. results (Figure 2). Yields for heights 10 in. or lower have only a 16% (100-84%) probability of being higher than 0.50 ton/ac, whereas yields for heights above 30 have a 91% probability of being 2.25 ton/ac.

In contrast to other applications, the Alfalfa Yield Predictor provides not one average yield as a result of a query but a whole distribution of yields for better decision-making. It is our hope that this program will assist producers, consultants, New Mexico Cooperative Extension Service personnel, and government personnel by providing a fast, user-friendly application for estimating alfalfa yields.

The Alfalfa Yield Predictor can be openly and freely downloaded at http://dairy.nmsu.edu: Tools. It is a spreadsheet containing macros that need to be enabled at first use. A document covering the specifics of downloading and using the application (user-guide) is also available at the same website and will also be available soon through the New Mexico State University College of Agriculture and Home Economics publications and videos page (http://cahe.nmsu.edu/pubs/_a/) as Guide A-333, "User Manual of the Alfalfa Yield Predictor."

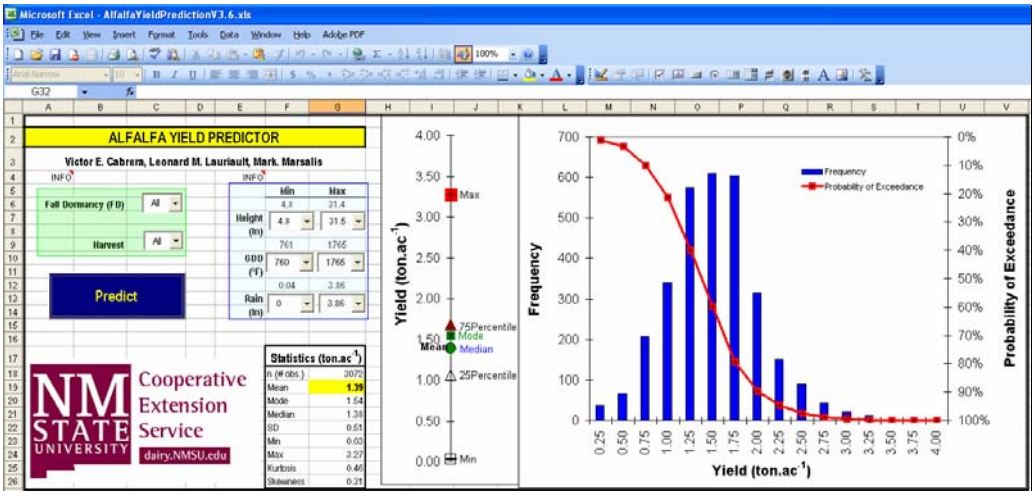

Figure 1. The Alfalfa Yield Predictor.

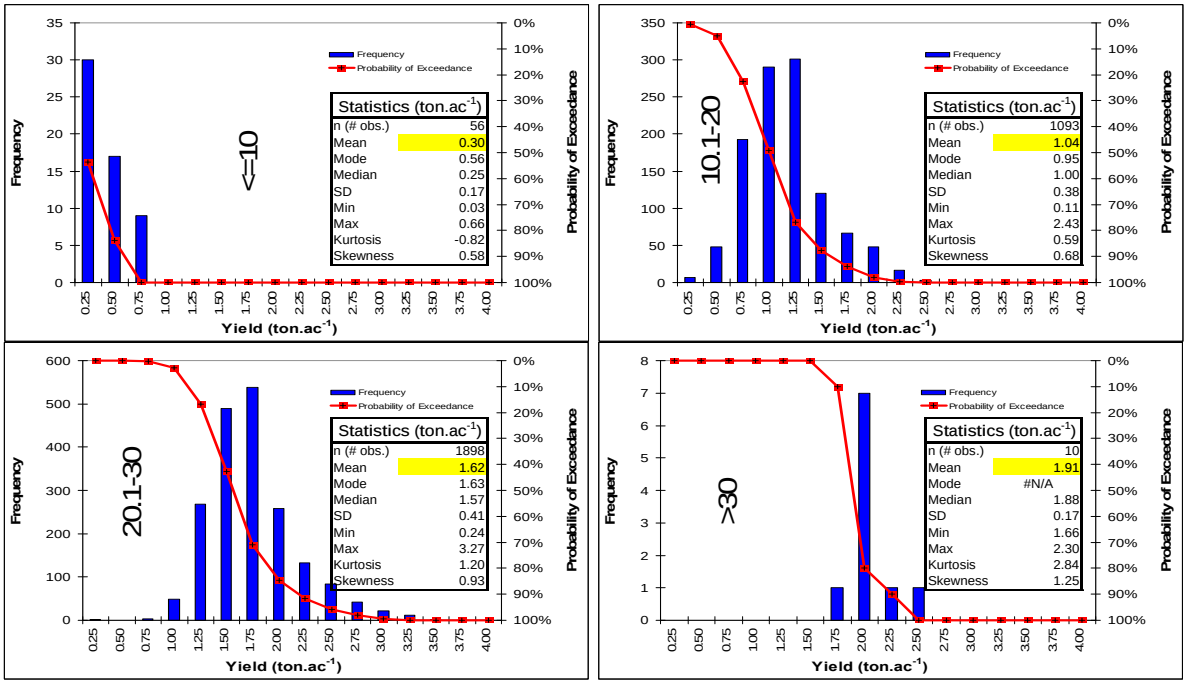

Figure 2. Alfalfa yield distributions for different height ranges: ≤10, 10.1–20, 20.1–30, and >30 in.

******* UPCOMING EVENTS *******

- 2007 California Alfalfa & Forage Symposium, Monterey, CA, December 17-19, 2007 (http://alfalfa.ucdavis.edu)
- 2008 Southwest Hay & Forage Conference, Ruidoso, NM, January 17-18, 2008 (http://www.nmhay.com)

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