

CALIFORNIA WHEAT COMMISSION

REPORT – Web Development

Research Project: Web Development and Development of Computer Tools for the Wheat Variety and Outreach Program

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Objectives: The objectives of this project were to develop the following, to create: 1) Plot Plan Creator– this quickly makes plot plans for field studies, 2) A data analysis package to quickly analyze standard field data in Excel, 3) An improved Web interface for Variety Data expression including a clickable map, and an archive of data so that industry and farmers can quickly find data. 4) A Web Interface for a ‘How to Select a Wheat Variety’ interface – with links to datasets and generally enhance the capabilities of a wheat Outreach Page. We have hired student programmers to complete these tasks.

Report: We have completed most of these tasks, and will continue working on several of them. Specifically:

Plot Plan Creator: We developed a fully functioning ‘Plot Plan Creator’ which quickly creates fully formatted field plot plans and datasheets for wheat field trials utilizing either a Randomized Complete Block Design or a Split Plot Design. This enables researchers to quickly make plot plans of various dimensions, completely numbered with plot numbers, randomized and allocated plot assignments, and plot datasheets for collection of data. Examples of the designs are given below – these were created in about 1.5 minutes.

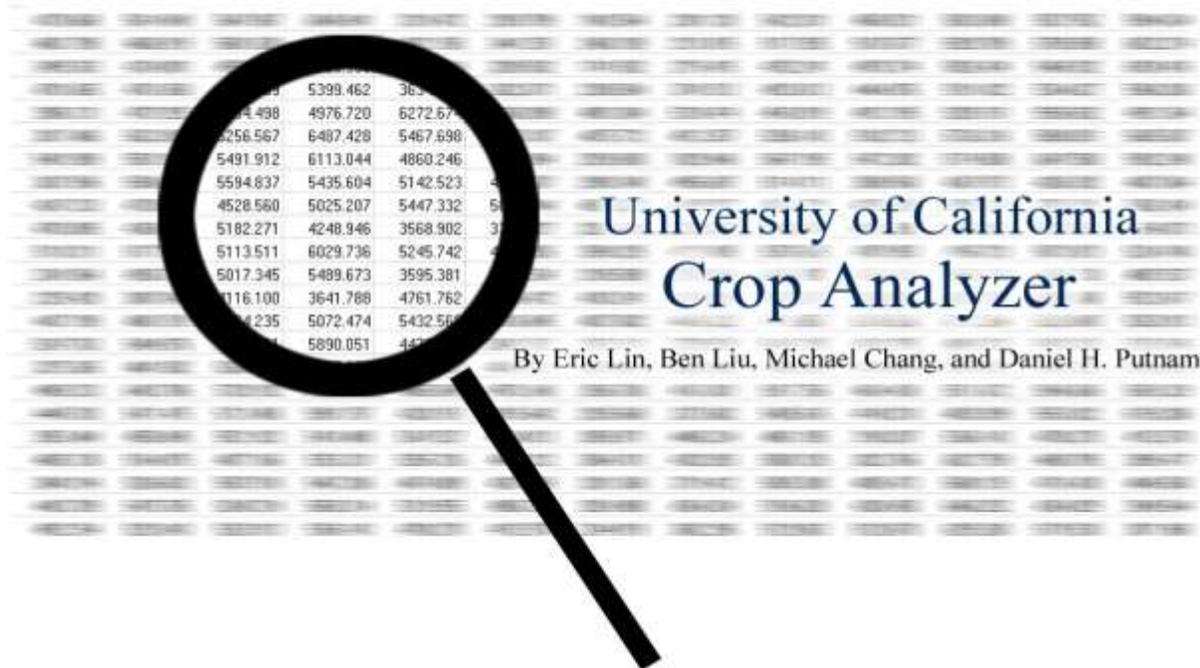
Crop Analyzer: We have developed a data analysis package which is set up to analyze standard wheat variety data originating from a Randomized Block Design. This Data Analysis macro was generated in MS Excel, and can analyze data quickly, creating fully formatted tables of the user’s preference. Examples are shown below. The user has a number of flexible options, as detailed in the instructions below. The user has the capability and option to display (for example) experimental vs. released varieties, calculate percent of check, ranks, include LSD letters (ABC etc.), develop headers and footnotes, and to add descriptive values into the final table. The Crop Analyzer is designed to work with datasheets developed by the Plot Plan Creator. As of this report, the Crop Analyzer is fully functioning and being tested on a range of datasets. We will continue to improve the software based upon feedback from the wheat project.

Web Interface for Choosing Variety Data: An interactive map has been developed, showing locations of the variety trials, and displaying the variety trial results. This is not yet live, and we

will continue to develop this web resource. We hope to complete this task within the next 2 months.

Continued Goals: Looking forward, we would like to work with the wheat project and Wheat Commission to continue to develop these web-based tools. We have discussed and explored the options of reviving the 'Agronomy Research and Information Center', which could combine resources with the wheat, rice, cotton, alfalfa, biofuels, bean, sugarbeet (etc.) crops, along with matching contributions from the Department of Plant Sciences to enhance web resources for these crops. Goals could include improve variety data display and accessibility, on-line courses, databases, videos, blogs, and other capabilities.

Wheat Datasheet for Plot Plan				Planted mm/dd/yyyy			
Plot	TRT	Rep	Height	Lodging	Yield	Disease	Etc.
1	28	4					
2	15	4					
3	17	4					
4	8	4					
5	18	4					
6	9	4					
.							
.							
.							
.							
114	8	1					
115	23	1					
116	17	1					
117	15	1					
118	10	1					
119	27	1					
120	14	1					



DESCRIPTION AND INSTRUCTIONS:

This Crop Analyzer is designed to analyze straight-forward Randomized Complete Block Designs from field trials, and generate formatted results tables. It utilizes a standard 2-way analysis (Block, Treatment). It is likely to be appropriate for variety trials, and balanced standard treatment designs with discrete variables (for example, non-continuous fertilizer treatments, or pest control treatments). It can handle some missing plot data (up to X), and data which has variable replications for individual data sets (for example, if some data has 4 reps, and other data has 2 reps). It is not appropriate for more sophisticated analysis. The purpose is to simplify the data analysis process, to quickly create tables from raw data.

Caveats: This has been checked with standard SAS analysis utilizing the same models. However, more complex analyses should be done with more sophisticated software.

INSTRUCTIONS for Crop Analyzer:

Step 1: Set up treatment variables, names and designate variables on the *TreatmentList* page. Treatments may be varieties or other treatments.

Treatment Number: Simply an identifying number for that treatment. Can be consecutive or random.

Treatment Name: Name of the treatment that will be displayed in the final table. For example 'Variety' or 'Herbicide'

Descriptor: Descriptor to be displayed on final table. This data will not be analyzed. This could be any descriptor, e.g. Maturity group, Dormancy group, etc. This will be displayed in a column next to the treatment name.

Organizing Variable: This can be used to organize the variables on the final table. It is not used in analysis. For example organizing Variables might be 'Experimental Lines' and 'Released Lines' or 'Triticale', 'Wheat' and 'Barley'. This allows organization of the data on the table, but all data is still analyzed together. User can designate the order of the organizing variable (Rank all organizing Variables here).

Control Treatment: If % of control treatment (for example, check variety) is calculated, this designates that treatment.

Hide: This designates any line that should remain hidden in the final table.

Step 2. Create Data sheet and Enter Data on the DataSheet page. The datasheet is created using independent data (design variables), dependent data, and data is entered.

On this page, users should:

Create Table Header: This should appear exactly as desired on final table. For example: "Table 4. Yield, lodging, maturity, protein, and disease ratings from 2014 Davis wheat variety trial"

Create Footnote: This should appear exactly as desired on final table. For example "Planted 12 November, 2013 at 50 lbs/acre pure live seed. Irrigated plots, Harvested 12 June, 2014"

Create Column Headings and describe units: This should appear exactly as desired in final table. For example, 'Yield' and 'lbs/acre'.

Fill out Independent Variables. These are the design variables designated per plot. Treatment and Replication (block). These must follow the designations from the plot plan.

Enter Dependent Variables: These are the measurements from the field, for example plant height, maturity (days), yield. Final calculated values must be used, single observation/plot.

Data must be in final format and units desired (for example Mg/ha not lbs./plot), so all calculations of data should be performed in a separate operation in an Excel datasheet, if necessary. Data must be arrayed in the format as shown: **Plot Rep Treatment Variable1 Variable2.... Variable10**

Where Plot is a simple passive identifier (plot number), Rep and treatment designated as independent variables as per the plot plan. Since the analyzer is meant to generate a single table for display of data, we have limited the analyzer to 10 (12-15?) variables.

Users must use the Treatment numbers which were set up on the *TreatmentList* sheet, and associated with names on that page.

Step 3. Designate Datasheet Options on the 'DatasheetOptions' page. This enables users to design the final display of data, and how it's displayed.

For specific Columns (dependent data), users can specify:

Significant Figures: This specifies the number of digits past the decimal point that is used for rounding on the final table.

Treatments to Ignore: This lists specific treatments, if user does not want those to be displayed

Replications to ignore: Sometimes replications need to be ignored due to problems with data, or that only a few replications are collected from the field. This can be by field.

Sort?: Designates column that is used as a sorting variable in the final display. For example, yield can be used as a sorting variable, displaying data from highest to lowest yielding variety.

Display Rank Numbers? User can choose whether to display the rank in parentheses beside the data in the column. Note: when chosen, this increases the number of columns in the table.

Display LSD Letters? User can choose to display LSD letters (A, B, C, etc.) next to the column designated. Note this increases the size of the table. Typically, only one variable might be chosen for this (e.g. yield), since it increases the size of the table. This assumes no missing values.

Display % of Check? User can choose to calculate percent of check, and place in a separate column to the right. Note: increases number of columns. Normally, this would be done on only one variable.

Step 4. Analyze Data (from the DataSheet' page). A button in the Datasheet is marked 'Analyze Data', which starts the macro which conducts ANOVA. There are some options during this operation.

Treatment List. This designates the Treatment List (named "TreatmentList") sheet which has the names of the treatments, etc.

ANOVA t-value Set. User can designate t-value for F-test. From 0.01 to 0.05, 0.10, or 0.20. (1%, 5%, 10%, or 20% confidence levels).

DISPLAY OPTIONS: Users have the options of Placing the LSD at the bottom, including a % of check column, Rank numbers for all variables, and including a total or average.

KEEP INTERMEDIATE SHEETS: (recommended): Users can choose to keep the intermediate sheets showing ANOVA tables, mean calculations generated by Excel. This is often useful for troubleshooting data.

START ANALYSIS: When ready, user presses ‘Start analysis’ and the macro begins, generating the final table within seconds.

Step 5. Look at Table (DataSheet.Analysis page). Double check the table to make sure it displays normally. This should be formatted to the specifications of the user. If in error, can be quickly changed and re-done. Double check some of the data to make sure it’s functioning correctly. This table then can be preserved as the results of the study. See example below (2012 data).

Data input snapshot for the Crop Analyzer is given below:

Trial Title Goes Here												
Units			Header									
Analyze												
Forage Analyzer version 1.0	Delta Yield	Davis Yield	Colusa Yield	Name	Name	Name	Name	Name	Name	Name	Name	Name
	lbs./ac.	lbs./ac.	lbs./ac.	Units	Units	Units	Units	Units	Units	Units	Units	Units
Order/Hide Columns -->												
Plot	Rep	Trt	2012	2012	2012	Date						
1	1	20	2905.01	4378.67	1230.05							
2	2	20	3215.44	5614.55	1297.86							
3	3	20		5647.97								
4	4	20	1926.24	6046.94								
5	1	788	2890.61	4601.80	1095.03							

**Demonstration table showing results from a recent wheat variety trial.
The Excel Crop Analyzer produced the same results as SAS.**

2012 Davis Common Wheat Trial							
	Entry	Yield lbs/acre	1000 Kernel Wt. g	Plant Ht in	Days To Heading From 3/1	Days To Maturity From 3/1	Shatter
Cultivars							
ANZA	20	5420 (11)	39.7	36	48	89	1.3
EXPRESS	788	5120 (22)	39.9	38	46	84	1.3
Mika	1340	4350 (38)	37.3	40	49	89	1.3
Patw in	1419	4930 (28)	-	34	49	84	1.1
Joaquin	1424	4540 (35)	41.5	36	37	82	1
Cal Rojo	1478	5300 (15)	41.2	33	43	81	1
Lassik*	1495	5650 (7)	-	37	45	83	1.4
Redwing	1521	5110 (23)	39.9	32	45	84	1.3
Blanca Royale	1522	4630 (33)	39.6	33	43	84	1.3
Blanca Fuerte	1523	4650 (32)	46.2	33	48	85	1.3
WB-Cristallo	1548	5360 (14)	40.5	35	48	85	1
WB-Rockland	1650	4700 (31)	41.6	35	43	81	1.3
Blanca Grande 515	1657	3470 (40)	36.5	34	43	81	1.3
New Dirwin	1667	4720 (30)	39.3	42	56	93	1.3
Patw in 515	1680	5450 (10)	37.6	32	49	85	1
WB-Perla	1729	4490 (36)	41.2	35	35	81	1
WB-Patron	1731	5920 (1)	45.3	38	47	86	1.3
Advanced Lines							
WB DA905-10	1624	5410 (13)	39.4	37	44	86	1
CLEAR WHITE 515	1679	4860 (29)	38.5	38	40	79	1.3
WWW CABR3509W	1684	5000 (26)	42.2	37	45	84	1.8
08SB100	1686	5010 (25)	41.5	37	49	88	1
08SB0658-B	1688	5200 (19)	42.1	35	47	88	2
UC 1710	1710	5130 (20)	40.4	37	50	88	1.5
UC 1711	1711	5280 (16)	45.7	31	49	85	1
UC 1712	1712	5410 (12)	50.3	33	46	83	1
UC 1713	1713	5900 (3)	40	36	47	86	1.5
UC 1714	1714	5710 (5)	39.7	35	47	86	1.5
UC 1715	1715	5270 (17)	40.7	36	45	82	1
WINCAL 09196	1716	5910 (2)	37.9	33	52	90	1
ATOMO	1723	5800 (4)	41.9	36	42	82	1.8
08SB0073	1724	5250 (18)	43.7	34	46	83	1
ATREVIDO	1725	5070 (24)	48.1	38	48	87	2.3
08SB0738	1726	5600 (8)	39.8	36	49	88	1.3
08SB0008-B	1727	5670 (6)	46.5	35	47	87	1.3
WB-JOAQUIN ORO	1728	4040 (39)	42.2	34	33	80	1
WB SJ907-229	1730	5120 (21)	40	37	46	85	1
WWW BR2308W	1732	5530 (9)	42.6	38	48	88	1.3
APB NM-1	1737	4990 (27)	-	31	46	81	1
APB W9-3AL	1734	4630 (34)	42.3	36	48	84	1.8
APB MC-1	1738	4420 (37)	-	33	50	90	1
MEAN		5100	41.5	35	46	85	1.2
CV		10	3.5	4	4	2	37
LSD (0.05)		550	2.9	2	3	3	0.7

Web-based Map of Variety Trial Data: This is still under development.

