Wheat Information Project (WHIP)
Another Web-Based Variety Trials Database.

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Introduction

Variety trial information is still most often presented in a static format whether this is in a physical or electronic print format. To create this type of variety trial information, agronomists and plant breeders can choose to present the results of individual site-years or combine results across years and locations. Research has shown that variety selection based on multiple years and multiple location data is more robust then the results of a single site-year in close proximity to a individual producer's farm or field. The reasons for which locations to combine vary from the completely arbitrary such as a political border to the delineation of an area of inference that has some biological relevance such as maturity zones. There have been several variety trial databases developed in the past such as the Illinois Variety Information Program for Soybeans (http://www.vipsoybeans.org) or the Colorado Wheat Variety Performance datebase (http://wheat.colostate.edu/VPT.html) that are interactive. Each of these efforts has their strengths and weaknesses.

Objectives

The objective of WHIP is to be a web-based variety comparison tool that::

- Is scalable and not restricted by political border such as a state line;
- Allows the user to create his/her own area of inference;
- Allows for meaningful means comparisons by applying the rigor of a statistical analysis.

Software

The database and web pages were developed in Django (http://www.djangoproject.com/) for Python (http://www.python.org/). The statistical analyses are done dynamically using the R programming language (http://www.r-project.org/) using the rPy (R to Python) interface.

Results

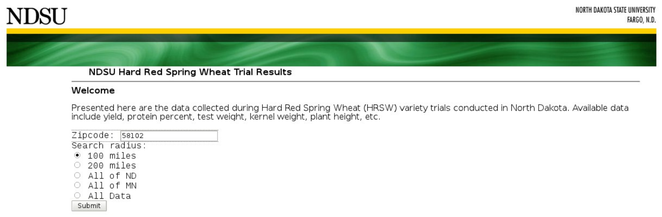
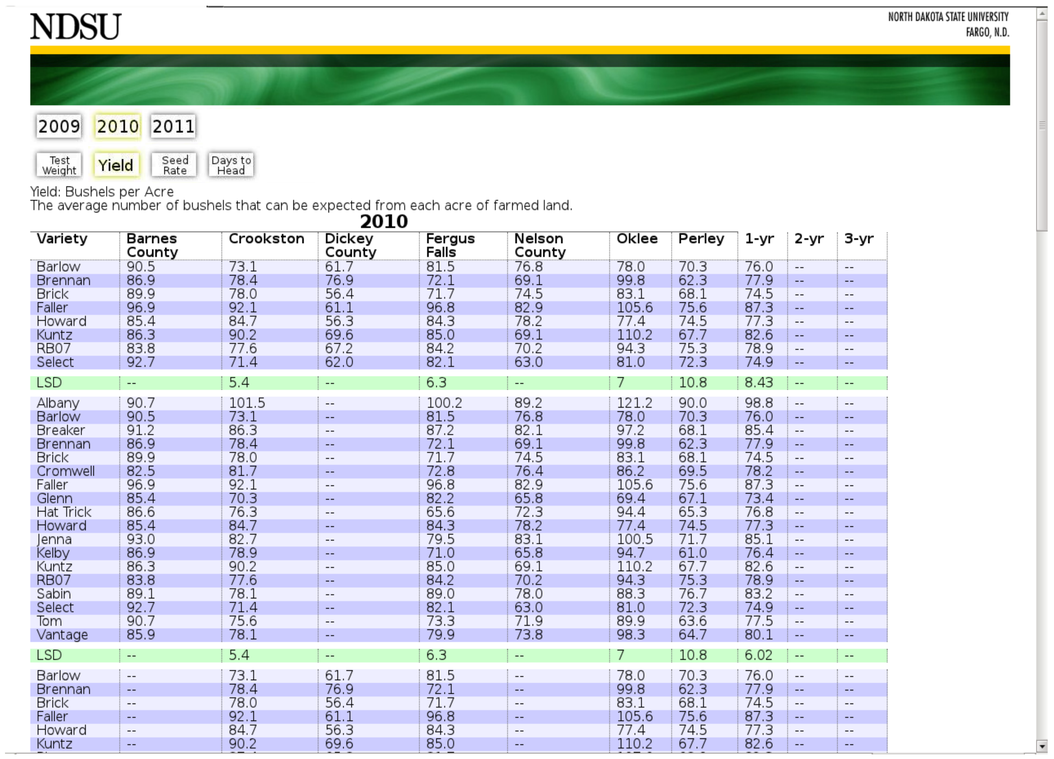


Fig. 1 – The entry screen in which the user defines the area of inference



2010

Variety	Barnes County	Crookston	Dickey County	Fergus Falls	Nelson County	Oklee	Perley	1-yr	2-yr	3-yr
Barlow	90.5	73.1	61.7	81.5	76.8	78.0	70.3	76.0	--	--
Brennan	86.9	78.4	76.9	72.1	69.1	99.8	62.3	77.9	--	--
Brick	89.9	78.0	56.4	71.7	74.5	83.1	68.1	74.5	--	--
Faller	96.9	92.1	61.1	96.8	82.9	105.6	75.6	87.3	--	--
Howard	85.4	84.7	56.3	84.3	78.2	77.4	74.5	77.3	--	--
Kuntz	86.3	90.2	69.6	85.0	69.1	110.2	67.7	82.6	--	--
RB07	83.8	77.6	67.2	84.2	70.2	94.3	75.3	78.9	--	--
Select	92.7	71.4	62.0	82.1	63.0	81.0	72.3	74.9	--	--
LSD	--	5.4	--	6.3	--	7	10.8	8.43	--	--
Albany	90.7	101.5	--	100.2	89.2	121.2	90.0	98.8	--	--
Barlow	90.5	73.1	--	81.5	76.8	78.0	70.3	76.0	--	--
Breaker	91.2	86.3	--	87.2	82.1	97.2	68.1	85.4	--	--
Brennan	86.9	78.4	--	72.1	69.1	99.8	62.3	77.9	--	--
Brick	89.9	78.0	--	71.7	74.5	83.1	68.1	74.5	--	--
Cromwell	82.5	81.7	--	72.8	76.4	86.2	69.5	78.2	--	--
Faller	96.9	92.1	--	96.8	82.9	105.6	75.6	87.3	--	--
Glenn	85.4	70.3	--	82.2	65.8	69.4	67.1	73.4	--	--
Hat Trick	86.6	76.3	--	65.6	72.3	94.4	65.3	76.8	--	--
Howard	85.4	84.7	--	84.3	78.2	77.4	74.5	77.3	--	--
Jenna	93.0	82.7	--	79.5	83.1	100.5	71.7	85.1	--	--
Kelby	86.9	78.9	--	71.0	65.8	94.7	61.0	76.4	--	--
Kuntz	86.3	90.2	--	85.0	69.1	110.2	67.7	82.6	--	--
RB07	83.8	77.6	--	84.2	70.2	94.3	75.3	78.9	--	--
Sabin	89.1	78.1	--	89.0	78.0	88.3	76.7	83.2	--	--
Select	92.7	71.4	--	82.1	63.0	81.0	72.3	74.9	--	--
Tom	90.7	75.6	--	73.3	71.9	89.9	63.6	77.5	--	--
Vantage	85.9	78.1	--	79.9	73.8	98.3	64.7	80.1	--	--
LSD	--	5.4	--	6.3	--	7	10.8	6.02	--	--
Barlow	--	73.1	61.7	81.5	--	78.0	70.3	76.0	--	--
Brennan	--	78.4	76.9	72.1	--	99.8	62.3	77.9	--	--
Brick	--	78.0	56.4	71.7	--	83.1	68.1	74.5	--	--
Faller	--	92.1	61.1	96.8	--	105.6	75.6	87.3	--	--
Howard	--	84.7	56.3	84.3	--	77.4	74.5	77.3	--	--
Kuntz	--	90.2	69.6	85.0	--	110.2	67.7	82.6	--	--

Fig. 2 – Partial WHIP output table for grain yield for all trials within a 100 miles radius of ZIP code 58102 (Fargo, ND), including the single year, across-locations means and LSD (α=0.05) values calculated by WHIP.

Discussion

The initial design and programming phase have been completed. The programming should allow for the database to handle yield trial information of other commodities and be capable to expand across all States.

The testing of the routines for multiple year comparisons and focus group evaluation of the generated output has not been completed to date.

Approach

Source Data - Any hard red spring wheat (HRSW) variety trial data in either Minnesota or North Dakota is eligible for inclusion in the database. These trials include local, regional, and statewide trials. Criteria for inclusion are that the (approximate) latitude and longitude are known (or a nearby zipcode) and the original trial was replicated and has a means comparison using Fisher's protected LSD (α=0.05)

Area of Inference - The user defines his/her area of inference by choosing the radius from the ZIP code he/she entered for the locale of interest or the State of interest (Fig. 1).

Data Queries - The database queries all available data and generates subsets of balanced data in which each individual variety was present at all locations (Fig 2).

Statistical Models - For individual locations the LSD (α=0.05) of the single year/ location initially supplied with the data is used. For the balanced data sets across locations within a year a mixed model is used in which locations are considered to be random. For the balanced data sets across locations and years a mixed model is used in which individual location/year combinations are considered environments. Analogous locations within years, environments are also considered to be a random effect.

Fisher's protected LSD (α=0.05) is calculated for each balanced set of data and printed at the bottom of the corresponding column.

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