Report on the March 10th, 2009, Soft Wheat Coordinated Project meeting.
Shisler Center, OARDC, Wooster Ohio

I. Agenda

2:00 PM Welcome

Brief Review of each CP and Milestone Matrix (Costa, Van Sanford, Sneller)

Group discussion of research topics identified at 2008 meeting, and more recently
  (Costa, Van Sanford, Sneller)

3:30 PM – Break out by region: NWW CP (Sneller), SWW CP (Costa)

5:00 PM – Update on data base

5:30 PM - Dinner and cash bar

6:30 PM – Discussion of research topics, plans by region, coordination between
  regions (Costa, Van Sanford, Sneller)

8:00 PM – Adjourn

II. Participants:

Fred Kolb	Univ. of Illinois
Herb Ohm	Purdue Univ., IN
Janet Lewis	Michigan State Univ.
Mary Guttieri	Ohio State Univ.
Clay Sneller	Ohio State Univ.
David Van Sanford	Univ. of Kentucky
Garl Griffey	Virginia Tech.
Shuyu Liu	Virginia Tech.
Jose Costa	Univ. of Maryland
Paul Murphy	North Carolina State Univ.
Gene Milus	Univ. of Arkansas
Steve Harrison	Louisiana State Univ.
Ed Souza	USDA-ARS, Wooster, OH
Barton Fogleman	AgriPro COKER, IN
Pierce Paul`	Ohio State Univ.
CJ Lin	Mennel Milling Company, VA
Don Mennel	Mennel Milling Company, VA

Individuals who participated via phone link:

Gina Brown-Guedira	USDA-ARS, Raleigh, NC
Anne McKendry	Univ. of Missouri
Mark Sorrells	Cornell Univ., NY
Mark Hughes	USDA-ARS, St. Paul, MN
Harold Bockelman	Kansas State Univ.

III. The milestone matrix from the NWW and SWW were distributed and reviewed. Dave Van Sanford clarified some USWBSI directives, particularly focus on end-results: high yield lines with FHB resistance and low DON.

IV. Discussion topics gleaned from 2008 meeting and recent communications prior to the meeting.

Item 1: Types of resistance:
Type I:
1. Strong interest in north to investigate Type I resistance
2. Sources include Truman, INW0412, others
3. Feel rating in field is sufficient
4. Truman, INW0412 progeny are being developed, can be available.
5. Family-based AM may be feasible

Type III (V), Resistance to seed infection and to DON accumulation
1. Evidence for existence in SRWW is being developed (OH, IL, literature)
2. Screening technique needed

Kolb stated that FDK and DON need to be emphasized. Ohm pointed out that sampling procedures (sample size, weather, harvest date, etc) can greatly affect DON levels. Milus distribute data from a greenhouse test of TI resistance. Lewis stated that multiple mechanisms are a key.

Griffey suggesting retesting outliers (eg lines with low DON but moderate Index, etc). Sneller stated that lines may be outliers for many reasons and that careful studies are needed to determine the existence of some mechanisms.

Item 2: Understanding and Utilizing Native Resistance
There are some nascent Association Mapping projects that are aimed at native resistance
1. Phenotyping the Sneller/Souza populations that has been DArTed – Variation for HD and Hgt may limit utility plus the degree of structure in the pop
2. DarT on the NUWWSN, SUWWSN – Gina Brown-Guedira - Degree of structure may cause problems, pop size. Will do 96 from 2008 nurseries, 96 from 2009s.
3. Analyses within breeding populations: key regions to see if they are important. Genome scans for finding more QTL.
4. Genomewide Selection/Association in OH wheat – embedded in an OSU/UMN/Cornell AFRI grant *to be submitted* – GS on 658 breeding lines.

*Item 3: Coordinated Mapping Efforts. * Funded*
1. *:NY has two populations (Harus, NY91017-8080 resistance)
2. *VA has 2 populations (Becker/Massey, Ernie/MO94-317)
3. VA is developing four doubled haploid populations (Renwood3260/Pioneer26R46, Tribute/Pioneer26R46, and ?Roane & Truman)
4. *MO has 1 population from Truman/MO94-317
5. Gina Brown-Guedira has 1 population (Nuese/AGS2000)

6. *IL has 1 population (IL97-1828 x Clark)
7. MD01W233-06-1/SS8641

It was suggested that we put together a list of FHB resistance sources (native and exotic) being mapped and new resistance sources for which populations have been developed and will be proposed for mapping during the next two year cycle. Develop collaboration plans to accelerate collection of phenotypic and genotypic data. Identify new and unique sources for which mapping populations need to be developed quickly (e.g. we need access to DH facility).

Item 4: Efficient use of MAS and QTL

Questions we need answers for include: How many FHB QTLs have/can be used effectively in breeding programs? How many reported FHB QTLs have been validated for effectiveness in multiple backgrounds? How many of these QTLs have diagnostic markers that have been show to be effective in MAS? How reliable is haplotyping? Liu pointed out that just Fhb1 is reliably identified in haplotyping and that just using other markers in MAS is less reliable especially if a marker haplotype has not been reliable associated with a resistant source and that source is being used in the MAS populations.

Item 5. Management/Breeding Studies
1. Genotype x fungicide interactions
2. Demonstration of the combination of best genetics and best fungicide to control DON

All seem to agree that we need to test and promote best management practices, but much debate on how and who should do this. We feel the studies should be done under inoculated conditions, should use a few of the most resistant, high yield cultivars available, with the best fungicide available. Should include a susceptible high yield check and untreated control. Plots size should allow use of proper spray technology. Rotation is not a factor here as we seek inoculum. These trials do not fit into present breeding trials. Nor do they fit into present studies to develop information on new fungicides, rotations, models, or other production practices. In addition, the results of the tests need to be made widely available to growers. The executive and/or steering committees need to determine whether this activity should be the responsibility of the Chemical and Biological Control research area, whose scientists have the expertise to conduct such research.

Item 6: Winter Nursery

For the past 3 years, Costa and Murphy have run a small off-season F1 nursery in Argentina. Herb has done this in the past as well. It is planted in April, F2s are harvested in November, planted in MD and NC in December, harvest F3s by July. Should we expand the Argentina F1 nursery to all the breeders in the Southern group (~500F1s? for scab (or even Northern) and add it as a Regional program? Some of the Northern germplasm would probably not do very well though (may not get enough vernalization and be too late heading). This would mean planting these ~500 F2s in NC and MD and then distributing the F3s. I think that ~25-30K would be enough for this depending on the eventual size? Since

2001, Herb Ohm has been vernalizing the F1s over the summer months, transplanted them in the greenhouse around 1 August, harvested the F2 seeds in last week of October and seeding at Evansville by 1 November.

Item 7: Uniform Testing and State Trials of commercial cultivars
   I. Uniform trials:
   II. Commercial Testing
       Establish more uniformity in official variety trails for FHB evaluation, how data is reported, and cohesive use of the data. Data from multiple environments (locations or years) needs to be provided to growers. Inclusion of current year, two and three year means for FHB data is needed. Having such data from OVT's is imperative as this provides direct comparisons among currently available cultivars and all not cultivars are not evaluated in the Uniform FHB Nurseries. We should screen entries in the UE, US, and regional nurseries for FHB in 2 or more locations
       Need to condense many FHB traits into a simply assessment of FHB resistance that growers will use.

V. Break out session by region

Notes from SWW Breakout
   1. Yield + FHB + Quality: Exotic sources: FHB drag for yield. Native more promising?
   2. Nature of resistance: Understanding the reaction of current varieties. Test named varieties.
   3. Knowing sources of resistance: what to cross? Unique sources (different QTL) Markers for different FHB R QTL
   4. Improve marker work/handling populations: Seed chipping? Fully integrate MAS into breeding. Need to develop better methods for isolating tissue.
   5. Size of misted nurseries
   6. Processing samples: FDK, DON.
   7. Greenhouse evaluations: are they useful?
   8. Phenotyping of mapping populations.
   9. Marker validation and fine mapping (for example 5A region is too big).

   What is working?
       1. Phenotyping.
       2. Markers
       3. Native resistance
       4. Misted nurseries
       5. Mapping populations.
   Topics
       1. Uniform OVT: testing and reporting should be standardized?
       2. Include UEN and USN in misted nurseries.
       3. Current mapping populations for the South (see above section on mapping)
   New Elite Southern Uniform Native FHB Res Nursery
   Purpose understand components of resistance in useful native sources

Bess, Ernie, Roane, Tribute, Massey, Neuse, MD01W-233-06-1, B9511, CK9474, B030543, NC line (awned) FHB1 check, Susc checks, 26R24, SS8641, 26R12.

Notes from NWW group

1. We discussed forming a joint project to investigate Type I resistance in SRWW. TI resistance seems to exist in many lines with strong TI noted in Truman, INW0412, IL00-8061, IL97-6755, among others. It was proposed that lines derived from these sources be used to determine our ability to i) select for TI, ii) determine role of TI in improving resistance, iii) develop markers for TI.

2. Use recurrent selection for FHB in populations where cross pollination is facilitated by male sterility. Ohio State/USDA/Univ ID have developed several such populations. The base of the populations is PNW germplasm but the populations have been crossed to multiple eastern SRWW cutlivars including several with good FHB resistance. They have already gone through 1 or more cycles of RS in an FHB nursery. The populations can be increased and distributed to multiple programs.

3.

VI. Databases update

Sneller presented a summary of the status of developing a data base for FHB. A group (Sneller, Murphy, Harrison, Griffey, Van Sanford, Hughes, Smith, Anderson) meet at the CDL in MN in late February. The group developed some basic ideas for what should be in the data base, how it could function, and what questions it could answer. Some features include

> Accommodate data from FHB and other uniform nurseries
> Use all data from all trials
> Coordinators will create uniform codes, names etc across tests
> Cooperators will need to submit uniform data, and more information

An excel file with proposed data fields was distributed. We hope to collect data from the 2009 nurseries in this format. Coordinators would try to get past data into this format as well.