Weather Factors Affecting Winger Wheat Survival\(^1\)

1. **BACKGROUND**

- To better understand “why” we lost winter wheat to weather extremes…
- Let’s review primary weather factors affecting winter wheat survival

2. **PATTERN OF WINTER WHEAT COLD HARDENING FROM PLANTING TO MATURITY**

![Chart showing temperature changes from planting to maturity with key stages: Just emerged, 0-1 leaves, 2 or more leaves, Maximum resistance, Starting to joint, Boot, Bloom, Soft dough, and months of October to June.]

Fig. 1. After Paulson et al, 1982

3. **PATTERN OF WINTER WHEAT COLD HARDENING FROM PLANTING TO MATURITY**

- Cold hardening begins in late fall.
- Plant gradually builds resistance to winter weather.
- Maximum resistance normally in December and January.
- Growing point below ground during maximum resistance period adds further protection.
- Most susceptible to low temperature prior to hardening in fall; throughout spring when tolerance is low.

\(^1\) S.R. Hendrickson, Manitowoc Count Agricultural Agent, UW-Extension, for Winter Wheat Update, 7/92. Appreciation to Dr. Ed Oplinger, UW-Extension Agronomist for materials.
4. FACTORS AFFECTING WINTER SURVIVAL

- Cyclic freezing and thawing… Increased injury from ice crystal growth in tissue.
- Mid-winter thaw…. Crown at base of plant is flooded.
  Prolonged thaw Flooded crowns die at warmer temperatures.
  Rain
- Ice encasement….. Traps carbon dioxide.
  Suffocation Inhibits respiration.
- Frost heaving….. Pushed root system out of ground.
- Dessication… Dehydration with subzero temperatures. Leaves more sensitive than crown. Snow acts as insulator; keeps soil temperature from going below critical levels.

5. HELPS EXPLAIN EFFECTS OF '91 –‘92

- Early hard freeze in late October.
- Little snow cover + warm temperatures during December-February.
- Freezing in early March.
7. **STAND EVALUATION**
   - Pull up several randomly chosen plants throughout field.
   - Dig each plant with as many of roots attached as possible.
   - Shake each seeding to free excess soil.
   - If soil adheres to roots in columns, root hairs are alive, as is plant.

8. **STAND EVALUATION**
   - Once “test 1” is complete, perform “test 2”.
   - Cut into crown at base of plant and expose tissue.
   - If crown tissue is white or light green, plant is alive.
   - If tissue if brownish, plant is likely dead.

9. **STAND EVALUATION**
   - Dig some plants, pot them indoors, and water to see if growth resumes.

10. **STAND EVALUATION**
    - Wisconsin:  5 or more plants per foot of row (minimum)
                  18 or more plants per foot of row (excellent)
    - Illinois: 15 live, green plants per square foot (minimum)
    - These are recommendations for grain.
    - For straw, 6-8 plants /square foot may be adequate (personal observation, 7/92).

**REFERENCES**
