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

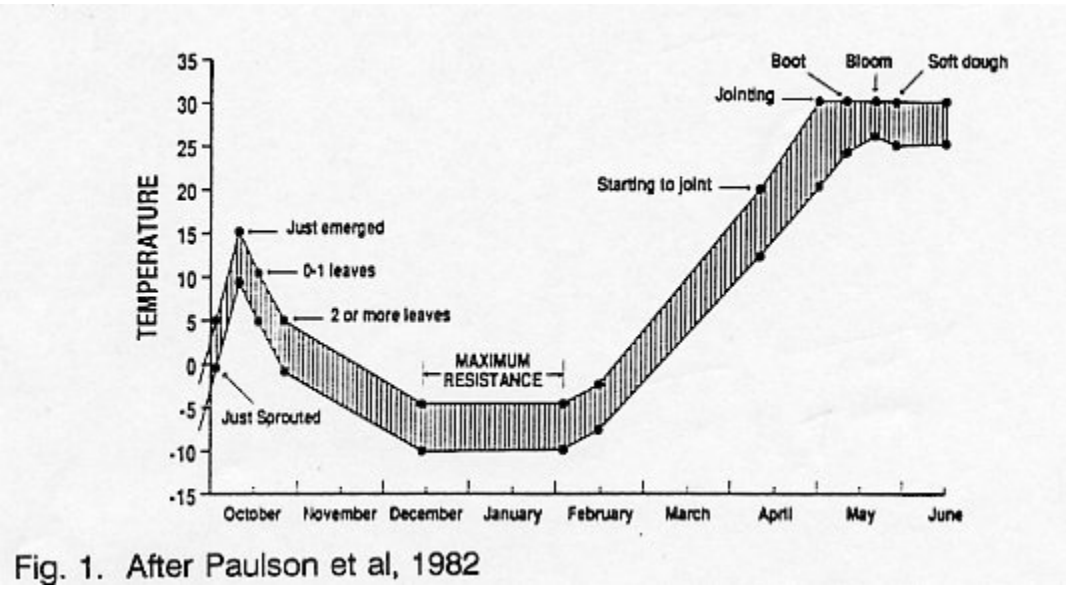

Fig. 1. After Paulson et al, 1982

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

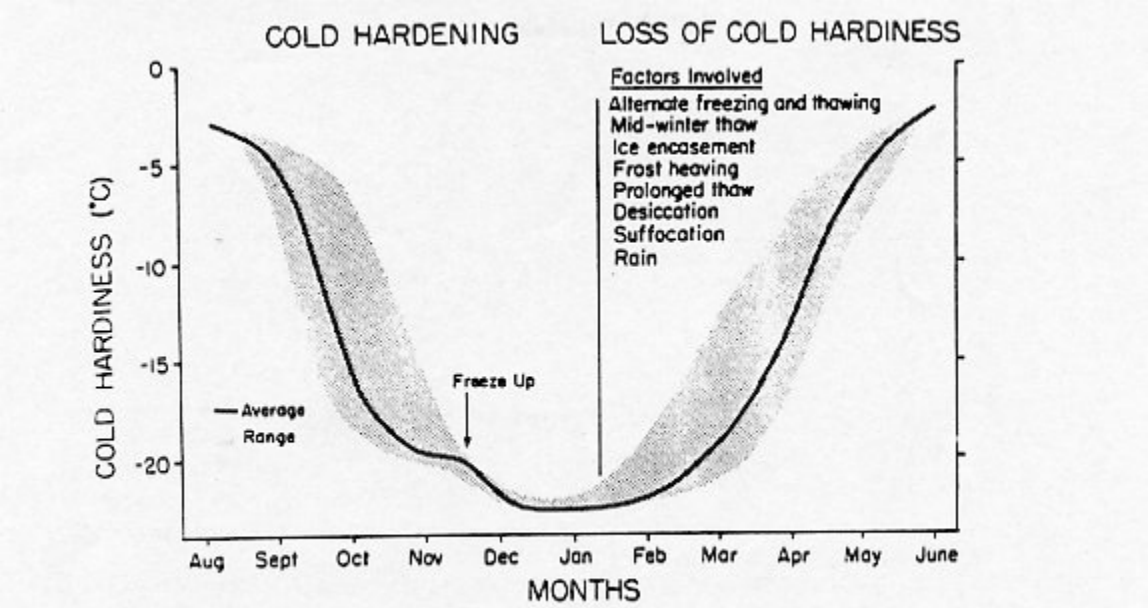

Fig. 4–1. Changes in cold hardiness of 'Norstar' winter wheat under field conditions in Saskatchewan, with primary factors responsible for any loss in cold hardiness.

5. 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.

6. 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

Sowers, K.E. 1990. Understanding Winterkill and Spring Freeze in Winter Wheat. J. Agron. Educ. 19:177-188.

1987. Winter Survival, In E.G. Heyne (ed.) Wheat and Wheat Improvement 2nd Ed. Agronomy 13: 155-124.