What the Wheat?!

Ruth Dill-Macky

University of Minnesota

Fusarium Head Blight & Bacterial Leaf Streak of Wheat

Ruth Dill-Macky

UNIVERSITY OF MINNESOTA

Wheat Diseases with Economic Impact

- Fusarium Head Blight
- Bacterial Leaf Streak
- Leaf Rust
- Septoria Leaf and Glume Blotches
- Tan Spot
- Stem Rust

Wheat Diseases with Economic Impact

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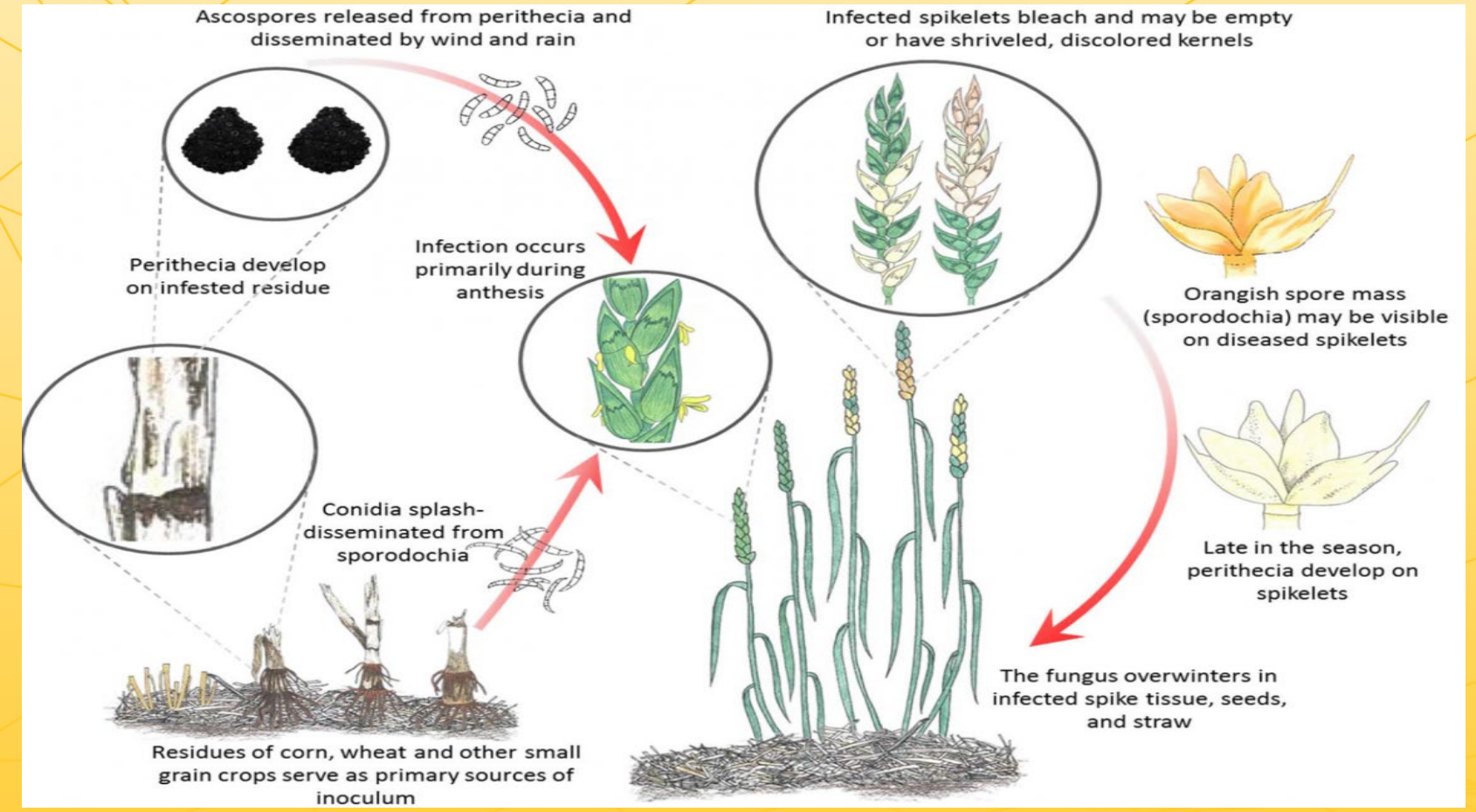
Fusarium Head Blight (Scab)

Fusarium Head Blight - Life Cycle



Mills, Salgado, & Paul 2016

Miravis Ave – a progress report

- A new fungicide for FHB and DON (Vomitoxin) control
- This summary is based on a single year's (2018) data
- Results based on multi-location analysis of pooled data from 6-18 environments

Summary

- Miravis Ace
  - as effective as Caramba or Prosaro when applied at anthesis
  - efficacy between anthesis & late applications comparable - but less consistent at early heading applications

- Two-treatments programs
  - Miravis Ace at anthesis
  - followed by Caramba, Prosaro, or Folicur 4-6 days later

  led to the highest level of vomitoxin reduction

- Combining Miravis Ace or Prosaro (anthesis) with resistance resulted in lower FHB and DON (vomitoxin)

  than resistance or fungicide application alone

Bacterial Leaf Streak

- Symptoms
- Importance
- Epidemiology and Biology
- Control Strategies

Symptoms of BLS

- Symptoms generally appear after heading
- Early symptoms – translucent stripes
  - small water-soaked lesions
  - lesions produce honey-like exudates
    - milky slime under humid conditions
    - hardens to resinous scale or granules
- Later symptoms - elongated, light brown lesions on leaves
  - initially these lesions are separate
  - later the lesions coalesce to cover solid areas

Bacterial Leaf Streak

Xanthomonas translucens pv. undulosa

Symptoms of Black Chaff

- On heads BLS is characterized by:
  - black, longitudinal, more or less parallel stripes on glumes
  - a greasy appearance
  - alternating bands of diseased and healthy tissue on awns

- Black chaff may be confused with pseudo-black chaff:
  - not caused by bacteria
  - a brown melanism known to be associated with Sr2
  - occurs in high temperatures & humidity

Black Chaff

Bacterial Leaf Streak

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Importance of BLS

- Evident in MN, ND and SD for the last decade
- Generally sporadic in nature
- Yield losses can be significant
  - reported yield losses generally <10% (max. 40%)
  - losses likely a function of timing of infection and area of flag leaf infected

Yield losses can be significant

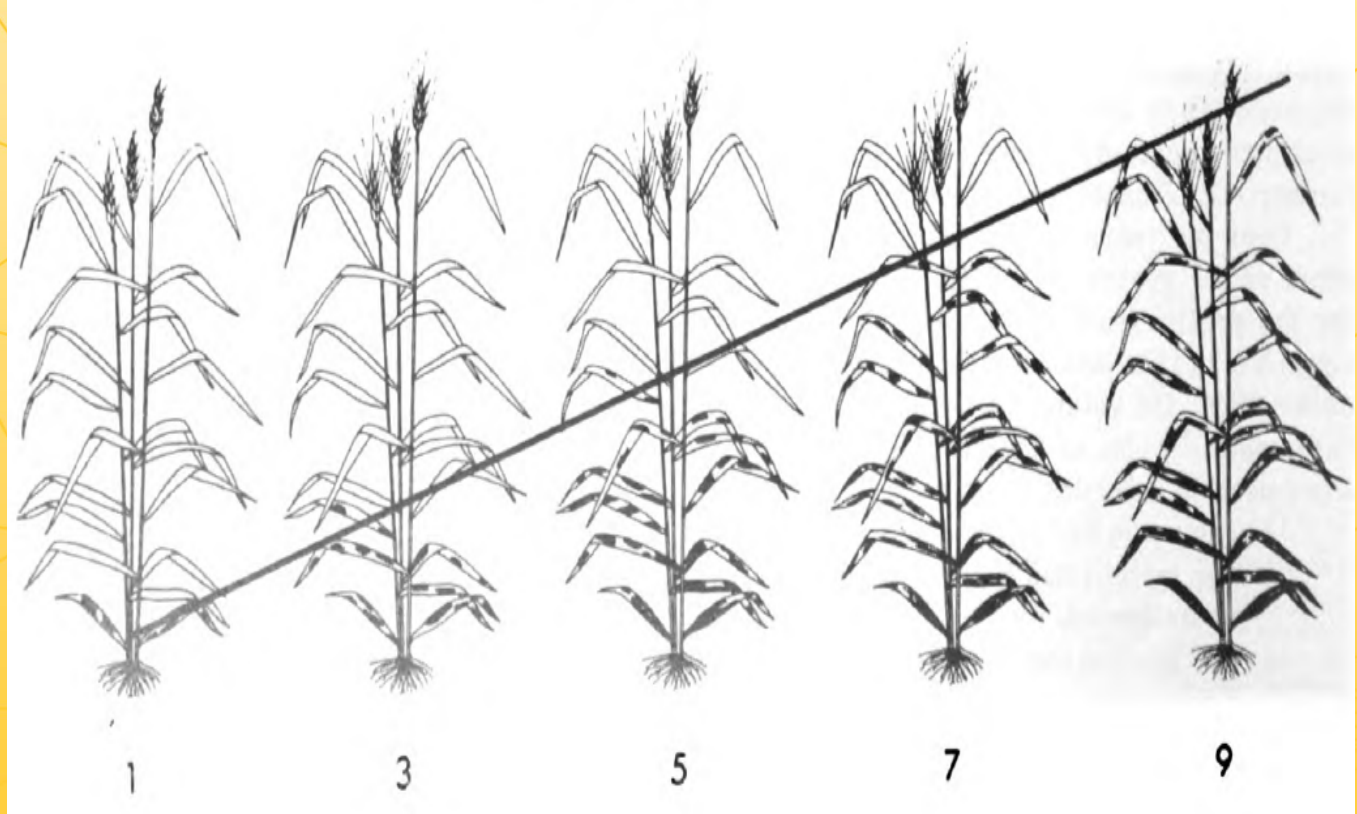
up to 40% in

hard red spring wheat varieties

under significant disease pressure

Field Evaluation

- Vertical disease progression
- Disease severity



Saari & Prescot 1975

Bacterial Leaf Streak

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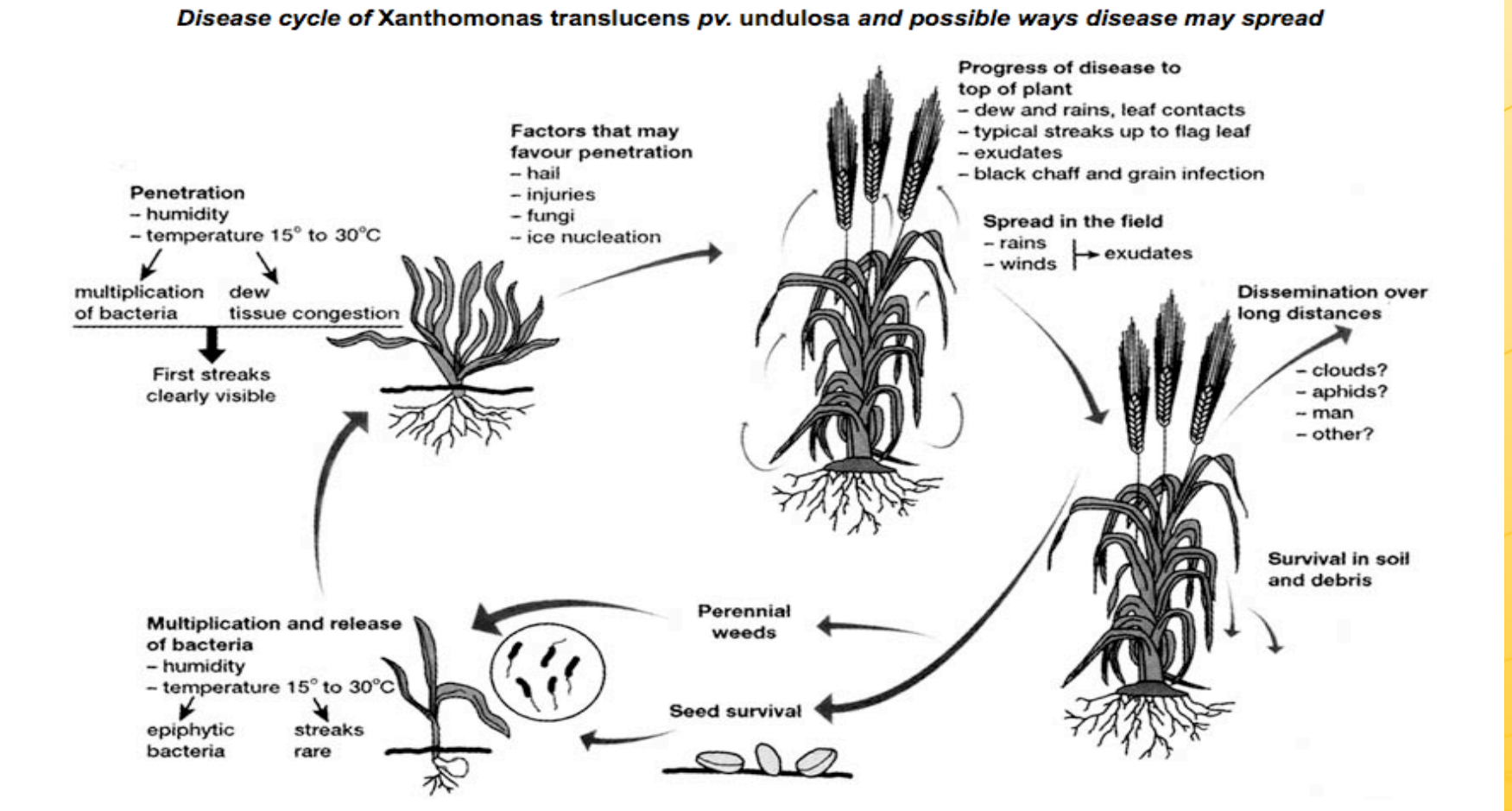
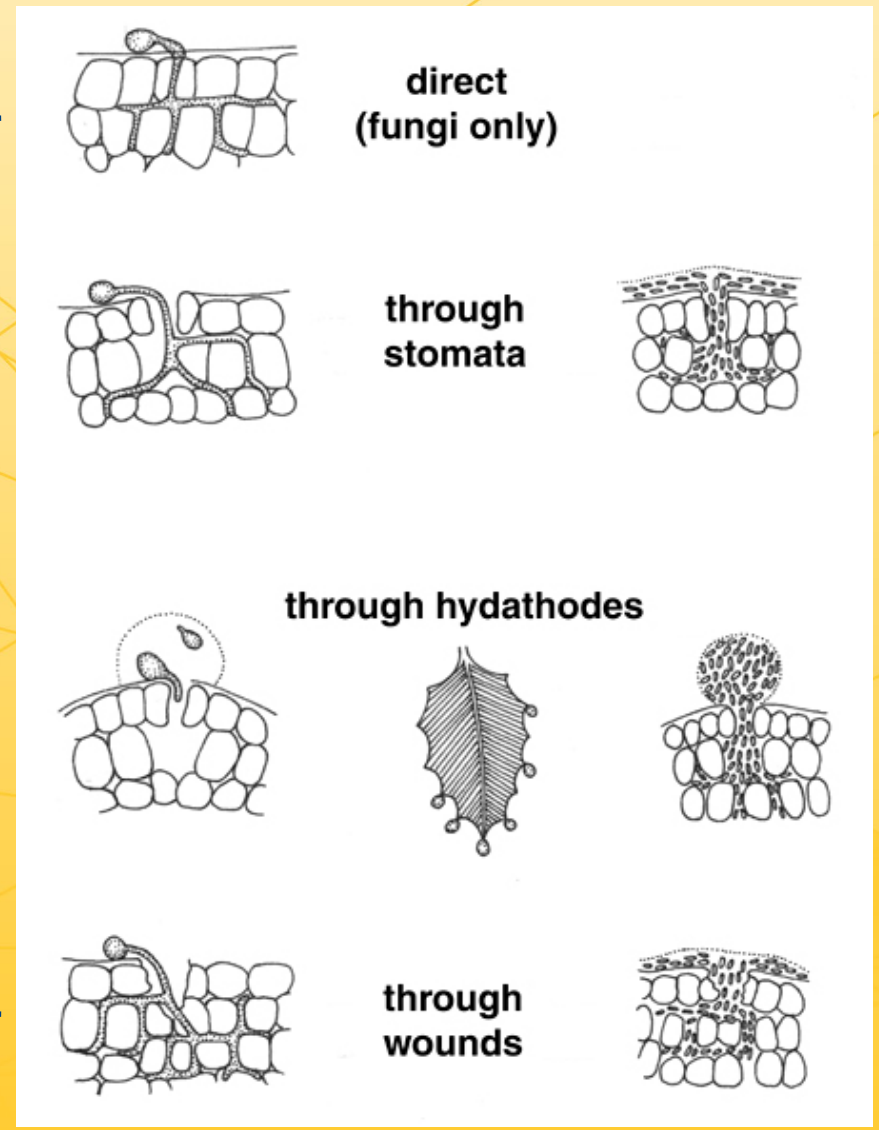
Bacterial Leaf Streak - Life Cycle



Duveiller et al. 1997

penetration of plant surfaces



fungi

bacteria

BLS Epidemics

- Survival
  - seed - but thought to have a low transmission rate
  - soil - survival is poor, likely better when crop debris is present
  - weeds - broad host range, survives epiphytically
- Conditions favoring epidemics
  - BLS is promoted by warm temperatures
  - wet leaves from dew and rain facilitate infection
  - micro-injuries to leaf surfaces aid infection
- Spread
  - rain, dew, plant-to-plant contact, epiphytic phase

BLS Epidemiology

- Factors contributing to the increase in BLS
  - susceptible wheat varieties
  - reduced tillage practices (debris and weeds)
  - warmer temperatures
  - changes in the pathogen population
  - other leaf diseases
  - increased use of fungicides

Bacterial Leaf Streak

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BLS Cooperative Nursery - 2019

Variety	St. Paul - MN	Crookston - MN	Fargo - ND	Brookings - SD	Mean
Boost	3.00	2.75	4.25	3.67	3.42
TCG-Spitfire	2.50	2.75	5.50	5.67	4.10
Blade	3.25	3.25	6.00	4.33	4.21
Lang-MN	3.50	2.75	6.00	4.67	4.23
Surpass	2.25	3.00	6.50	5.33	4.27
Advance	2.75	3.25	6.00	5.67	4.42
TCG-Wildfire	3.75	3.00	5.75	5.33	4.46
Faller	3.00	3.00	5.75	6.33	4.52
Prevail	3.50	3.25	6.50	5.00	4.56
Rollag	2.75	2.50	6.75	6.33	4.58
Prosper	3.00	3.00	6.25	6.33	4.65
SY Valda	3.25	3.25	6.50	5.67	4.67
Dyna-Gro Ballistic	3.00	3.00	7.00	6.00	4.75
MN-Washburn	3.00	4.00	5.75	6.33	4.77
Shelly	3.00	3.50	6.00	6.67	4.79
Cromwell	3.50	3.50	5.75	6.67	4.85
ND VitPro	3.50	3.00	7.25	5.67	4.85
SY Rustler	3.25	3.50	7.00	5.67	4.85
Focus	3.75	3.00	7.50	5.33	4.90
TCG-Climax	3.00	4.25	5.75	6.67	4.92
MS Chevelle	3.75	3.00	7.00	6.00	4.94
Dyna-Gro Caliber	3.25	3.00	7.25	6.33	4.96
TCG-Cornerstone	4.50	3.25	6.50	5.67	4.98
Knudson	3.25	4.00	6.75	6.00	5.00
Bolles	3.75	4.50	7.25	4.67	5.04
Dyna-Gro Ambush	3.75	4.50	7.25	4.67	5.04
Linkert	4.25	3.50	6.50	6.00	5.06
SY Ingmar	4.00	3.00	6.75	6.67	5.10
RB07	3.50	4.25	7.50	5.67	5.23
SY Longmire	4.00	3.50	7.75	5.67	5.23
Forefront	3.75	3.50	7.50	6.33	5.27
SY Soren	4.25	3.25	7.25	6.33	5.27
SY Rowyn	4.25	3.00	6.75	7.33	5.33
TCG-Glennville	4.00	3.25	7.75	6.33	5.33
MS Camaro	3.75	3.25	7.75	6.67	5.35
SY Rockford	4.25	5.25	6.50	6.33	5.58
TCG-Heartland	4.75	3.25	7.50	7.00	5.63
Dyna-Gro Commander	5.00	3.25	7.75	6.67	5.67
Hattrick	3.50	4.25	7.75	7.33	5.71
Samson	4.50	5.00	8.00	5.67	5.79
SY McCloud	5.00	3.25	7.75	7.33	5.83
Select	5.25	5.00	7.25	6.33	5.96
MS Barracuda	4.50	4.75	8.00	6.67	5.98
TCG-Stalwart	4.75	6.50	7.75	7.67	6.67

- Responses are variable – location and maturity influence disease development
- Resistance is not complete – no immunity

-3 S.D. or more
-2 S.D.
-1 S.D.
+1 S.D.
+2 S.D.
+3 S.D. or more

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Bacterial Leaf Streak

- Fungicides have no impact on BLS
  - though they may help reveal BLS infections
- Host resistance available - selection of varieties
  - avoid planting susceptible varieties
    - CP3910, Dyna-Gro Velocity, MS Barracuda, MS Camaro, Rollag, WB-Mayville
  - consider varieties that have BLS resistance
    - Boost, CP3915, Dyna-Gro Ballistic, Lang MN, LCS Rebel, LCS Trigger, MN-Washburn, ND-VitPro, Surpass, SY Ingmar, SY Longmire, SY Valda, TCG-Spitfire
- Avoid using highly infected seed
- Control weeds – esp. perennial grasses