Major sunflower diseases and their management in USA: A review

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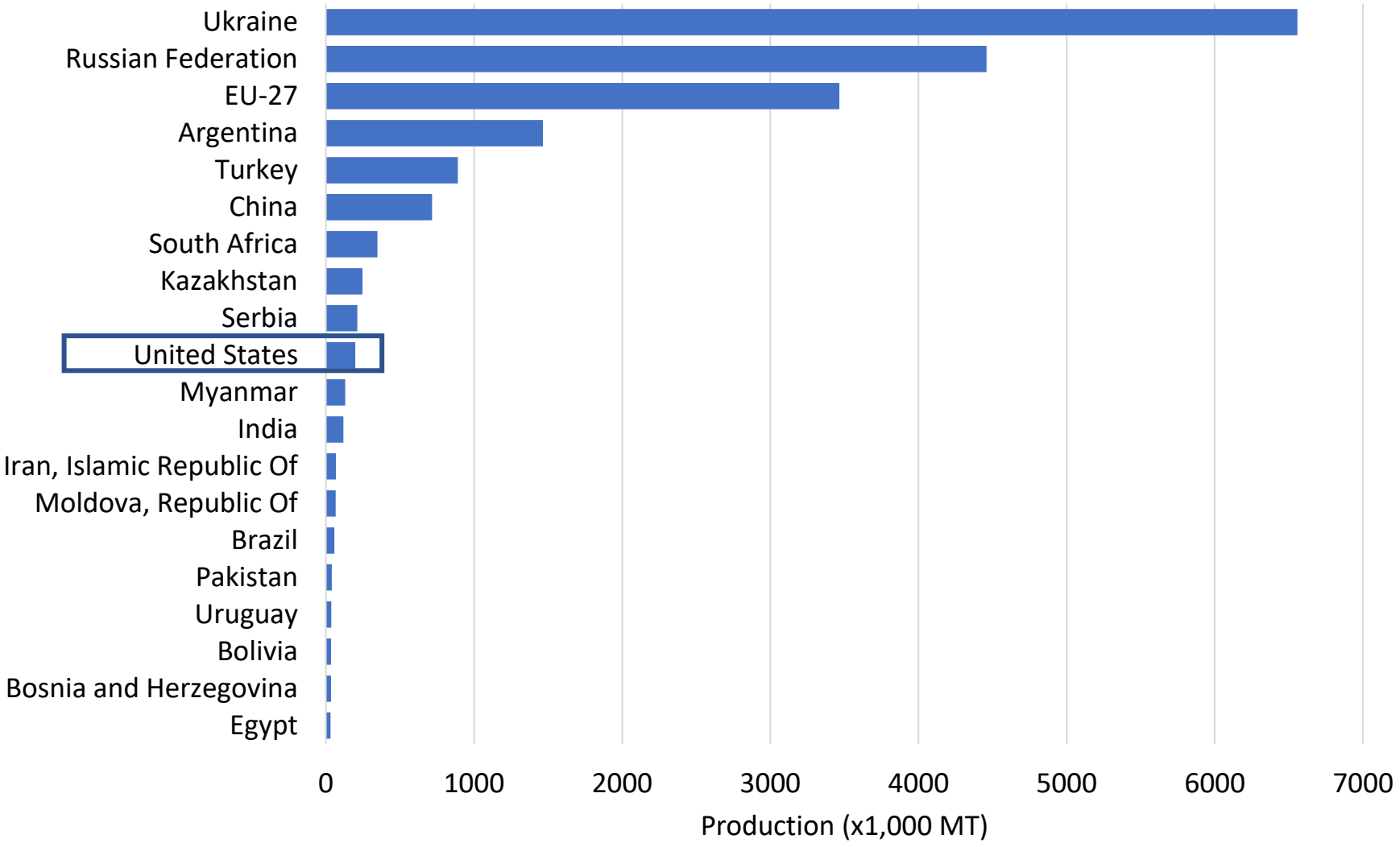
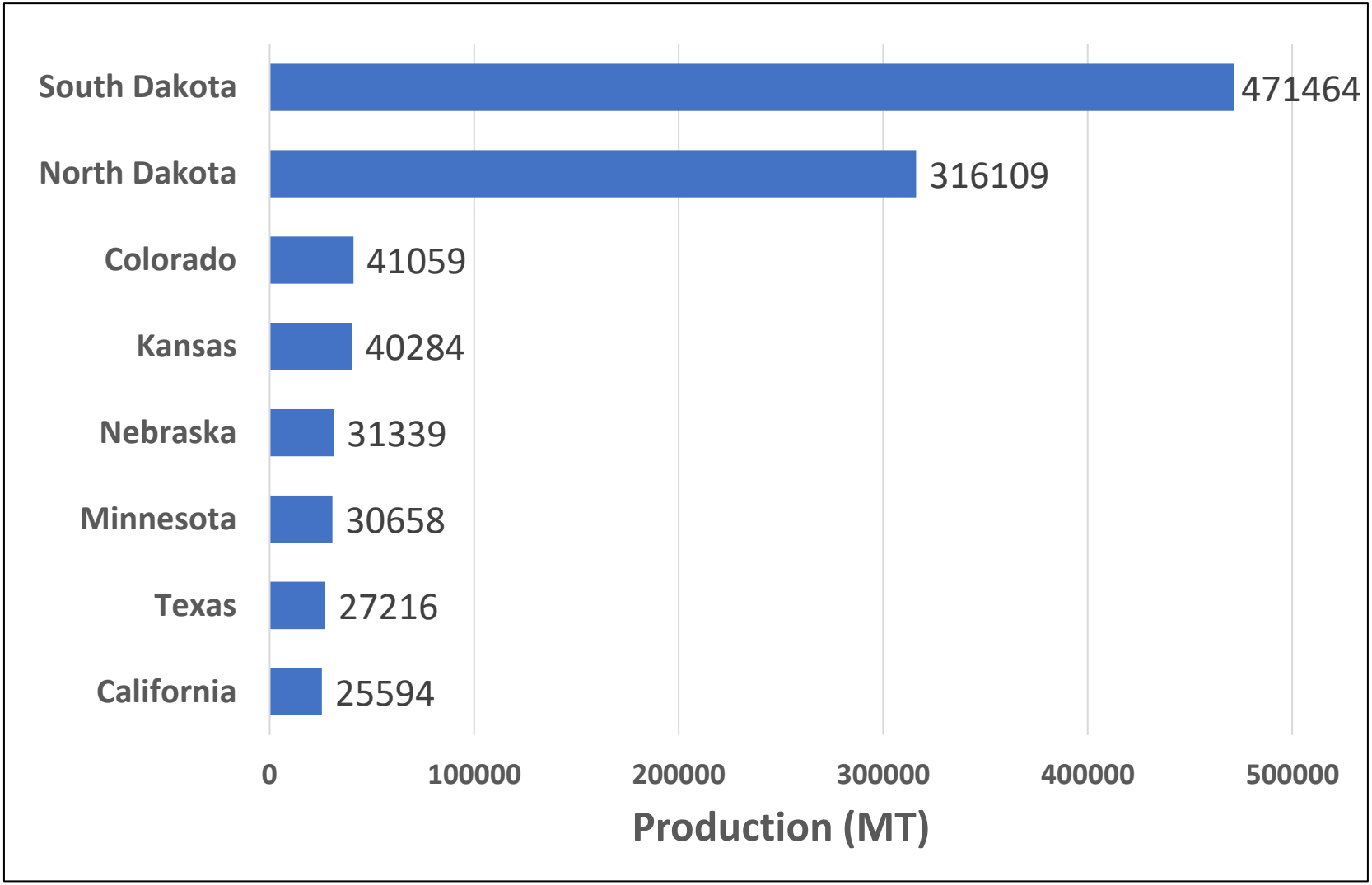
Top 20 sunflower producing countries



https://www.statista.com/statistics/190452/leading-us-states-for-total-sunflower-production/

Top sunflower producing states 2017



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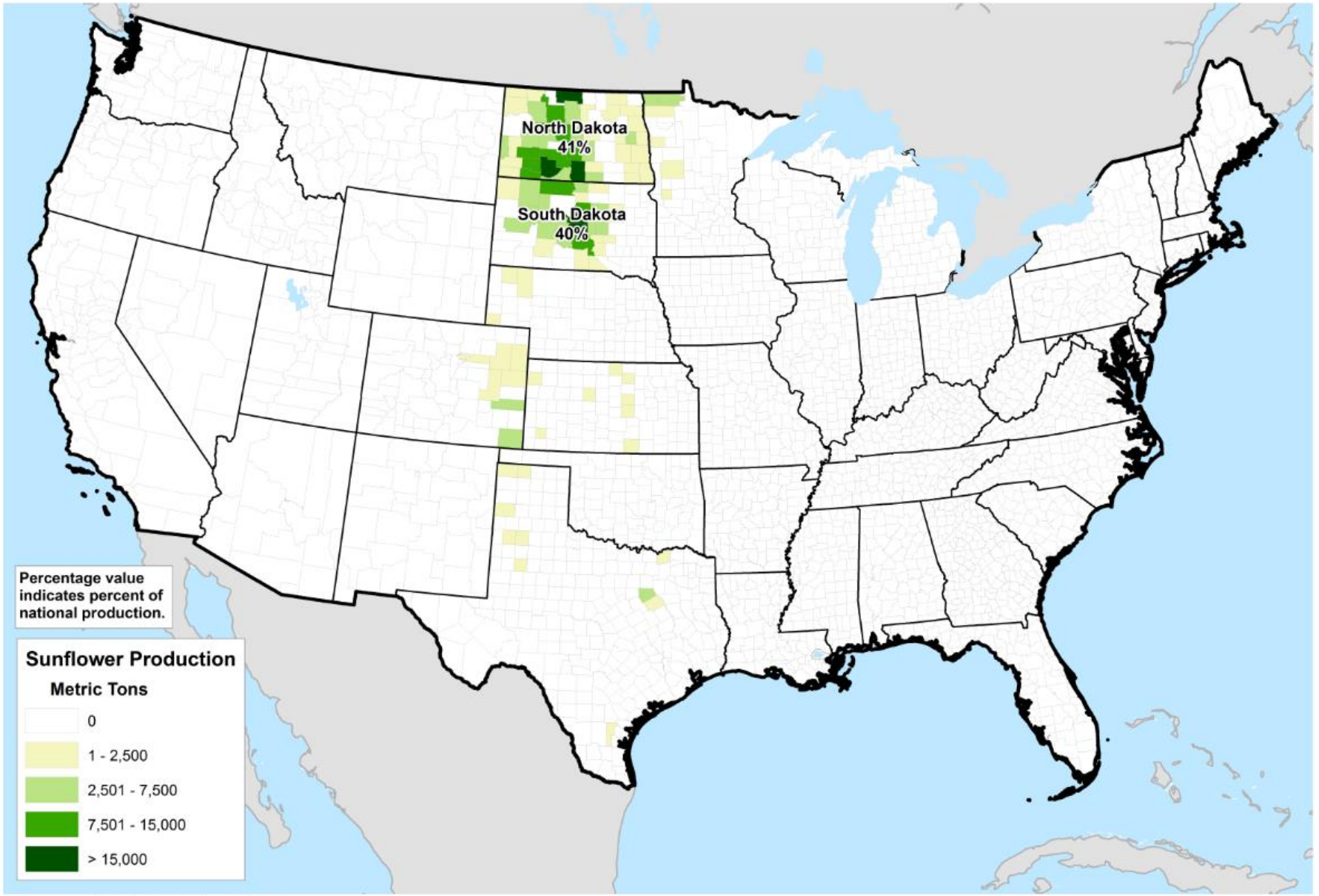
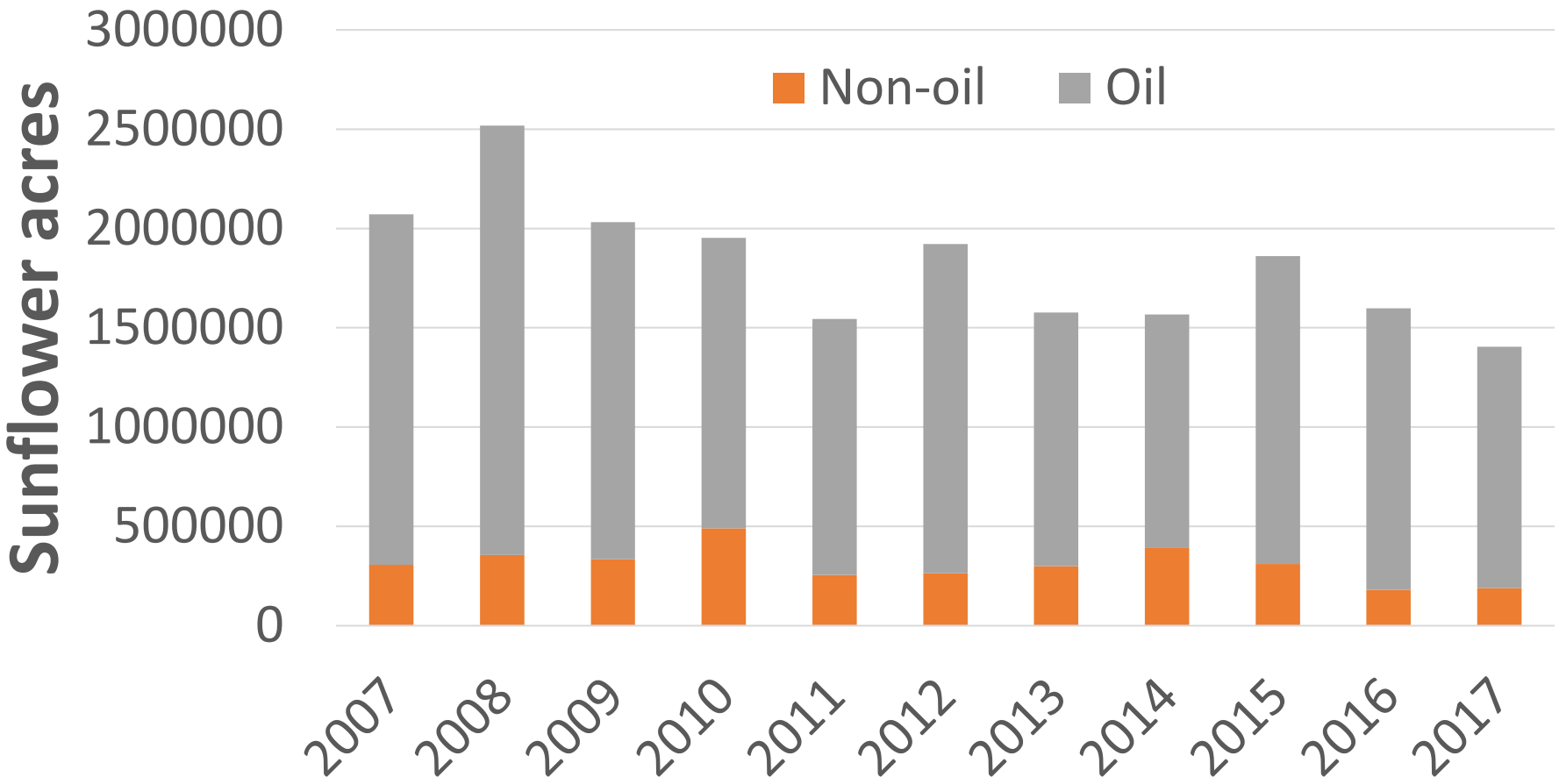
United States: Sunflower Production



USDA Foreign Agricultural Service
Office of Global Analysis
International Production Assessment Division

Source: NASS 2012-2016 5-Year Average
Total Sunflower Production by County

Sunflower acres in the last 10 years



Major diseases

- Down Mildew

Downy mildew

- Caused by *Plasmopara halstedii*
- Infection can occur in seedlings or during vegetative growth stages
- Symptoms include stunting, seedling death, leaf bleaching.
- Infection promoted by cool wet conditions after planting esp in low lying areas.
- Pathogen overwinters as oospores

Downy mildew symptoms

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Downy mildew management

- Host resistance (*Pl* genes) – limited by many pathotypes of the pathogen (33 races Viranyi et al. 2015; Qi et al. 2016)
- Fungicide seed treatment limited by pathogen resistance to metalaxyl and mefenoxam. New fungicide Oxathiapiprolin
- Destroy volunteer sunflower and wild sunflowers around the field edges to reduce inoculum

Phomopsis stem canker

Source: NDSU

Phomopis stem canker

- Caused by *Diaporthe heliathi* and *D. Gulyae*; *D. heliathi* more predominant (Mathew et al. 2015). New species D. Stewartii recently reported (Mathew et al 2016)
- Symptoms develop during late vegetative stage. Infection originates from the leaf to the stem – triangular lesion
- The main damaging symptom is the stem canker – elliptic dark brown lesion on the stem – leading to lodging

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Credit: T. Gulya

Phomopis stem canker

- Pathogen survives in infested sunflower residue as mycelia and pycnidia

- Warm and wet conditions favor infection from ascospores mid to late season

Phomopsis stem canker management

- Tolerant hybrids – Resistance is being developed (Gulya et al 2014; Mathew et al. 2018)
- Rotations - >5years
- Fungicides – repeated applications
- Residue management- through tillage.
- Weeds and volunteer sunflower management

Sunflower rust

Sunflower rust

- Caused by *Puccinia helianthi*
- An autoecious rust pathogen – does not require an alternate host
- Infection can be initiated from urediniospores blown into the field or from teliospores
- Infection promoted by prolonged leaf wetness (>6 hours) and cooler temperatures (10-25 ^{o}C)
- Cooler temperatures and host maturity lead to telia development.

Sunflower rust management

- Resistance – 13 R genes but few are incorporated in hybrids; rust races change often, race 777 can overcome many R genes (Zhang et al. 2016)

- Timely fungicide application – 1% rust severity on upper 4 leaves prior or during blooming (R5) (Friskop et al 2015).

White mold/Sclerotinia

- Basal rot,
- Stem rot
- Head rot

- Basal and stem rot can lead to lodging
- Head rot leads to seed contamination and yield loss

White mold basal rot

White mold/sclerotinia stem rot

Source: NDSU

White mold head rot

Source: NDSU

White mold/Sclerotinia

- Basal rot can develop from mycelia in the soil
- Stem and head rot develop from ascospores produced from apothecia
- Stem/head rot common when there is frequent rainfall and cooler (< 28 C)

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White mold/Sclerotinia management

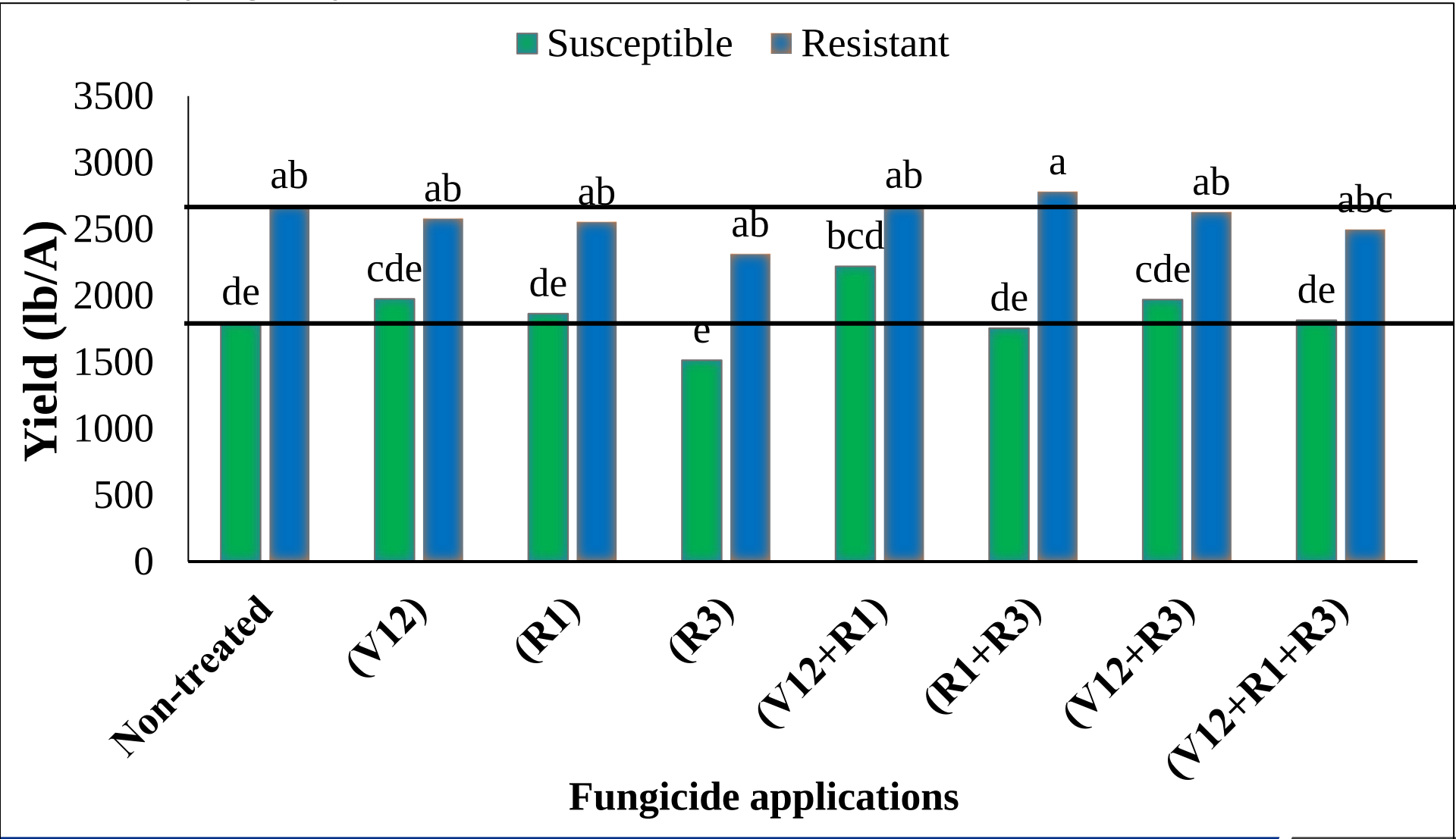
- Planting tolerant cultivars – breeding for resistance difficult because of quantitative resistance (Lu et al. 2003);
- Screening elilte entries ongoing (USDA/NDSU)

- Crop rotation >4 years

- Soil-applied Contans can help reduce inoculum

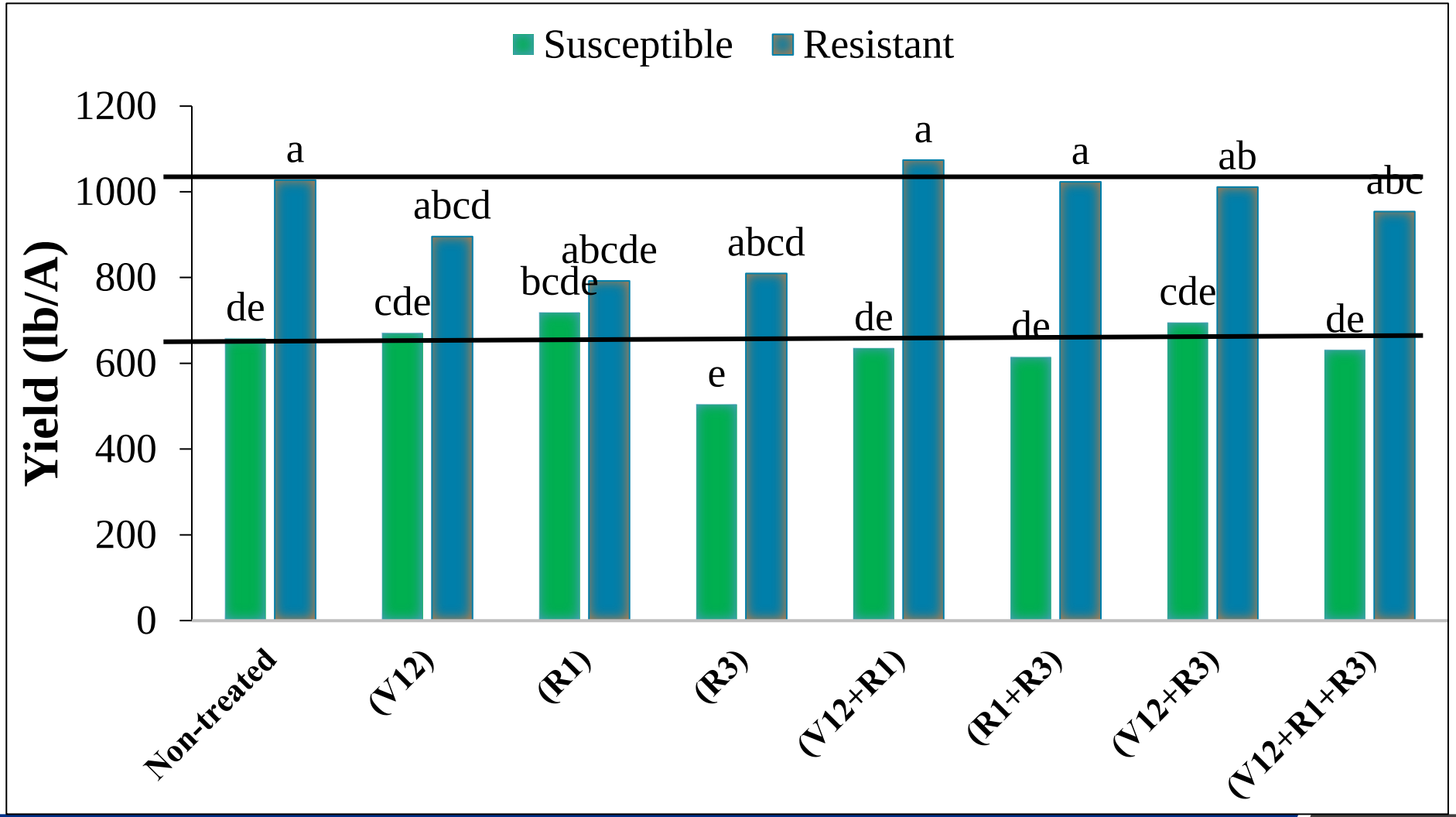
Central location

- Priaxor @ 4 fl oz/A (Fluxapyroxad + Pyraclostrobin, BASF)
- Mycogen hybrids.



East location

- Quadris @ 6 fl oz/A(Azoxystrobin, Syngenta)
- CHS hybrids.



Thank you!

Alternaria leaf spot

Septoria lea spot