CROPPING SYSTEM STRATEGIES THAT CAN REDUCE DROUGHT IMPACTS

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Presentation Outline

- Management strategies for corn and soybeans
- Adding winter annuals or other cool season crops to the rotation
- Alternative crops that tolerate drought or avoid drought
- Role of perennial biomass crops, including switchgrass and Miscanthus
- Adjusting cropping systems and land use to fit our soil and climate resources
We need cropping systems that are resilient
Drought Resistant Varieties

• Select based on yield stability and performance

• Consider varieties with GMO traits (but these traits may be targeted for regions to south and west)

• Early maturities is a positive but having a range of maturities can be a risk reducing strategy

• Resistance to insects and certain diseases important for stress conditions
Managing Corn and Beans for Possible Drought Conditions

• Adopting drought resistant varieties
  – Dupont/Pioneer: Aquamax
  – Syngenta: Artesian
  – Monsanto: Droughtguard
Syngenta Artesian corn hybrids

From Syngenta press release: based on 1100 Corn Belt trials
Planting Date, Plant Population and Fertilization

• Early is generally better but a mix of planting dates and maturity groups can be beneficial
  – Especially important for corn pollination

• In the past, reduced population was helpful in a drought, but new corn varieties are designed to hold yield under high populations

• Fertility is complex – you want good root growth but less fertilizer may be needed in a drought
  – Split N treatments for corn
  – Placement and distribution of nutrients in soil profile is important
Response of corn yield to narrow rows

Butzen and Paszkiewicz, Pioneer, 2006
Tillage and Residue

• “Each time you till you lose on average the equivalent of $\frac{1}{2}$ inch of rainfall”
  – Dr. Jerry Hatfield, ARS National Lab for Ag & Env.

• Farmers may be concerned that 100% no-till can leave soils too wet in spring

• Can we remove crop residue for feed or energy?
Using Cover Crops and Building Organic Matter

• Do cover crops help or hurt spring moisture?
  – When and how does the cover crop die
• Impact of cover crops on soil tilth, porosity, and rainfall infiltration
• Distribution of nutrients in the soil profile
• Other ways to build organic matter?
Sweet Yellow Clover
Crimson clover
Tillage Radishes

Photo credit – Skip Peterson
Hairy vetch and oats
Double Crop Options

- winter canola - double crop (dc) soybean
- northern Missouri
  - winter wheat - dc sunflower
  - winter wheat - dc buckwheat
- sandy soils
  - winter wheat - dc cowpeas
  - winter wheat - dc sunflowers
  - winter wheat - dc pearl millet (southern MO)
- spring flax - dc buckwheat
Canola
Canola

• Good alternative to winter wheat, often more profitable (depending on distance to market)
• Price tracks soybean prices
• Winter canola grown in Missouri is non-GMO
• Over a million acres grown in U.S. but still import a large amount to meet demand
• Demand is partially for biofuel but mainly for healthy food oil use
Sunflowers

• Seeds are 40-45% oil
• Drought tolerant crop
• Native American crop
• Wide planting window
• Large number of oilseed and confectionery varieties; all commercial varieties are hybrids but not GMO
  – Confectionary type are used for snacks, baking
  – Oilseed types are higher oil and higher yield
  – Most oilseed varieties now available are NuSun, which means mid-levels of oleic acid (45-70% oleic)
  – Also many new ornamental varieties for cut flowers
Cowpeas

• Traditional Missouri market is in the Bootheel
• Find out the market class the buyer wants
• Typical “good” yield is 1200-1500 pounds/acre
• Price varies widely
• Best niche is on sandier soils
• Can be double cropped
Grain Sorghum
Amaranth was first promoted by Robert Rodale and others in the 1970’s.

Rodale Research Institute (Pennsylvania) develops several improved cultivars for release in 1980’s.

Most amaranth now imported but can be easily grown in the U.S.

Has received substantial interest due to nutritional value.
Oats
Flax
Flax

- Grown as an early spring crop like spring oats
- Historically grown all over eastern/Midwestern U.S.
- Traditionally used primarily in non-food markets, such as linseed oil for paints and varnishes
- Resurgence of interest as a food ingredient due to high levels of omega-3 fatty acids
Buckwheat
What About Bioenergy Crops?
Giant Miscanthus
Giant Miscanthus
Designing our cropping system landscape
Possible Funding Sources

• Conservation programs can possibly provide cost share or incentive payments, such as EQIP or CSP through state NRCS

• USDA SARE Farmer/Rancher Grants
Summary

• For commodity crops, choose varieties with high yields over multiple years/locations; GMO drought traits may not be big advantage for MO yet

• Managing to reduce stress, especially during pollination and seed set is critically important

• For overall cropping system, need to:
  – Diversify crops and varieties used
  – Build soil organic matter and overall soil health
  – Preserve soil cover to maintain moisture