Pre and Post Harvest Handling and Storage of Organic Grains

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Today's Discussion

Corn

Oats

Soybeans

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Producing Food Ingredients, NOT Grain!








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Pre-Harvest Inspection

- Know your varieties/hybrids – strong points and limitations
- Identify potential problem areas in the field
- Develop a harvest plan -
  - Weedy Areas
  - Diseased Areas
  - Immature plants

Be Aware of Potential Quality and Storage Problems Before Harvest

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OATS

Wild Oats

Crown rust-
(Leaf Rust)

Stem Rust

Barley Yellow
Dwarf Virus
(Red Leaf)

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CORN

- Aspergillus Ear Rot:
  - Hot and dry growing conditions
  - Aflatoxins may occur with the development of this ear mold
  - Reduces grain yield and quality
  - Little if any resistant hybrids at this time. Overwinter in plant residues

- Fusarium Ear Mold:
  - Most common fungal diseases on corn ears
  - Normally after warm and dry conditions after silking
  - Insect damage – point of entry
  - Fungal spores overwinter on crop residue or other grass crops
  - Grain Yields, quality and test weights are affected

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CORN

- Diplodia Ear Rot:
  - Wet and warm weather during early silk until 3 weeks after silking.
  - Wet Weather during grain fill, upright ears with tight husks.
  - Fungal Infections starts at the base of the ear.
  - Reduced grain quality and yield due to smaller kernel size and test weight.
  - Hybrid selection important for tolerance and resistance.
  - Crop Rotation
  - Partial or complete burial of corn residue may provide some disease control.

- Gibberella Ear Rot:
  - Northern and Eastern Corn Belt areas.
  - Cooler, wet weather after pollination
  - Early, severely infected ears may rot completely, with husks adhering tightly to ear and mold growing between ear and husk.
  - Reduces grain yield, quality and test weight.
  - Grain Storage life is greatly reduced
  - Mycotoxins in the form of vomitoxin may develop, making grain unsuitable for food, feed or ethanol production.
  - Scout fields before harvest – harvest infected fields early to limit disease

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SOYBEANS

White Mold

Pod and Stem Blight

Phytopthora Root Rot

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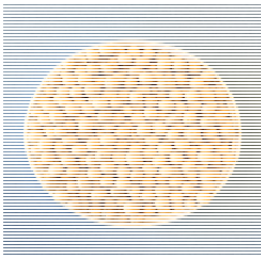
SOYBEANS



The Goal!!

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Pre Harvest Prep – All Crops

- Clean Grain Handling Equipment
- **SAFETY FIRST!!!**
  - Grain carts and wagons
  - Semi's/Hopper trailers
    - hopper bottoms/slide gates
    - In and around tarp
    - Compressed air or wash out
  - Bins Augers/Conveyors
    - Flush with grain and store separate
    - Wood Chips
    - Also check auger fliting for wear
  - Storage Bins
    - Kernel Clean
    - Compressed air/sweep
    - Ledges, ladder, sump, unload system
    - Corn can quickly create "cocktail" of molds and mycotoxins which will spread throughout the grain

Pre-Harvest Prep – All Crops

- Storage Bins
  - Sealed to prevent water penetration
  - Tight hatches, and covered vent openings – to prevent insect and rodent infestations
  - Repairs any holes in storage bin floor or wall

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Pre-Harvest Prep – All Crops

- Combines
  - Clean out between crops – especially if you have parallel production!!
  - Row Crop head, reel, feeder house, augers, elevators, ledges – ***ANYWHERE*** other crops can get hung up or stuck
  - ***Open it up and shake it out!***
  - Use a shop vac out, compressed air
  - Shake it out one more time!
  - Post Clean-out – Purge the combine with the crop you are harvesting – empty combine and store separately form contracted grain

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Harvest and Storage

Oats and Small Grains

Swathing

- Target average kernel moisture of 25 percent or below
- Greenest kernels just changed to cream colored
- Oats unlike other small grains mature from the tip kernels down to the base kernels. Bottom 2/3 of kernels contain 90% of the oat yield
- Green hulls not desired

Combine

- Avoid dehulled kernels – OK to remove Oat glumes, but not the lemma or palea. If these are removed , the oat seed will think it is time to start germinating, causing potential sprout damage
- Slow cylinder speed and widen concave clearances if dry conditions. Turn up the fan to help remove as much FM as possible. Check manufacturer for settings.

Drying

- Target of 12-13 percent moisture on oats
- Target 15-18 percent on wheat – don't let field dry too long
  - Increases chance of lodging and low test weights

Harvest and Storage

➢Oats and Small Grain (cont.)

- Bin Aeration recommended while filling to help remove thins and FM
- No heat if at all possible
- Dryer temps less than ~65C (150F)
- Max Grain temps between ~45 to 50C (110 to 120 F)
- Clean, Dry Storage in the best

➢Food Grade Corn

❖ **Harvesting**

- Start harvest with a grain moisture of 20% if possible
  - Helps minimize breakage from too dry corn
- Start with a wider concave setting and lower rotor speeds.
- Continually check corn for breakage/damage and adjust combine accordingly

Harvest and Storage

➢Food Grade Corn (cont.)

❖ **Harvesting**

- Increase combine fan speed to help remove FM in corn

❖ **Reduce GMO Contamination**

- Harvest border rows
- Store separately to be on the safe side

❖ **Drying and Storage**

- Dry uniformly
- Dry slow with low temps – never above 110 degrees actual grain temp
- Use high volumes of air to dry
- Cool slowly with high volumes of air – try not to cool corn with air temps much below 50 degrees
- High heat drying and/or cooling too quickly with cold air will increase stress cracks
- Food Grade Corn – 14.0 to 14.5 % moisture for longer term storage

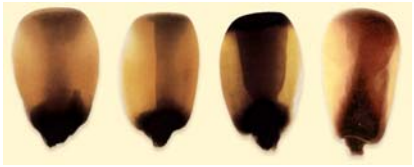
Harvest and Storage

➢Food Grade Corn (cont.)

- Keep grain within 10 degrees of outside ambient temperatures using aeration fans
- Cool grain slowly on a regular basis until grain temp nears freezing
- Warm grain in late winter/early spring by no more than 5 degrees at a time to avoid moisture formation in the grain mass
- Once started, continue until completed so warmer air does not condense on grain
- During summer aerate on cool dry nights to hold grain temps down

❖ **Hard Endosperm Corn**

- 87%+ Hard Endosperm vs. Soft Starch
- Translucent area vs. dark area of the kernel
- Stress Cracks – less than 15-20%



Harvest and Storage

➢Food Grade Soybeans

❖ **Combine Settings – Basics**

• Cylinder/Rotor Speed	300-400 rpm depending on model
• Air Flow	1000-1200 rpm
• Too many pods in the tank	tighten concave vs. increasing cylinder/rotor speed
• Too many split/damaged soybeans	Open concave and reduce cylinder/rotor speed if possible
	Calibrate feed auger/reel speed to prevent bunching into the feeder house
	Keep returns to the cylinder rotor to a minimum

Check with your manufacturer/owners manual for more information on settings!

Harvest and Storage

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➢ Food Grade Soybeans

❖ **Combine and Truck Unloading**

- Decrease auger speed when unloading
- Leave a little in the tank until the last load
  - Make sure all augers are in good shape and not severely worn
- Belt Conveyors??

Remember – food grade soybeans do not tolerate excessive handling!

❖ **Harvest Moisture**

- 14% if bins have aeration Using air, reduce moisture to 12-13% for storage

❖ **Immature Stems or Weeds**

- Moisture can cause combine dirt and dust to stick on seed coats

❖ **Seed Coat Staining – dirt, weed seeds**

- Harvest around these areas
- Do not harvest during morning or even dew – brings moisture into combine!

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Harvest and Storage

➢ Food Grade Soybeans

❖ **Bin Storage**

- Aeration Important to bring moisture down and cool soybeans
- Spreaders – spread evenly, but keep from throwing them against bin wall
- Don't peak the bin – level top to help prevent moisture migration to the top and to help prevent crusting.
- As with other grains, acclimate the stored soybeans in the late winter/early spring as temperatures warm, to prevent moisture accumulation and storage molds

Clean Bin – Clean Grain

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Bin Treatments

➢ Diatomaceous Earth (DE)

- ❖ **Approved for Organic Production**
- ❖ **Notify the company that you are selling your production to that you will be using DE in your storage bins**
- ❖ **Method**
  - Start with an empty, clean bin
  - Dust the empty bin – 2 pounds DE. Can apply through an aeration fan
  - Treat the bottom 2 feet of grain - 8 pounds of DE.
  - Treat the top 2 feet of grain – 8 pounds of DE.
  - Layer the bin with DE on every 5th load - 1 pound per ton of grain
  - Top dress the grain after the bin is full – 1 pounds of DE

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Thanks for listening!

Questions?

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