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CORN

Drying the 2009 Corn and Soybean Crops[1]

[1] Sam McNeill, Extension Agricultural Engineer and Mike Montross, Associate Professor with the University of Kentucky Biosystems and Agricultural Engineering Department.

The cool wet fall has drastically delayed normal field drying of corn and soybeans and will add to operating costs for all drying systems. High temperature automatic batch and continuous flow dryers will require 10 to 15 percent more energy per bushel because of the cool, humid air which has less moisture holding capacity than normally seen in the fall. Producers who usually rely on natural air drying in the bin may want to consider installing a low temperature burner or using a space heater to add between 5 to 10 degrees to the outside air. This will lower the humidity of humid/night time air by roughly 10 to 20 percent, respectively, and speed up drying. If too much heat is added, grain in the bottom of the bin will be overdried, which adds considerably to drying costs and market weight loss.

Drying limits for corn and soybeans are shown in Table 1 and 2, respectively. These are the moisture levels each grain will reach after sufficient exposure to the air conditions shown. For example, at 50 degrees and 70 percent humidity, corn will reach 15.5 percent moisture and soybeans will reach 14.0 percent moisture. Tracking the average weather conditions during fan operation is important for maintaining appropriate grain moistures within the bin.

Table 1. Equilibrium moisture content of yellow corn (%wb) at different temperature and relative humidity levels (shaded area represents safe storage levels through March).

Temp	Relative Humidity (%)						
F	40	50	60	65	70	80	90
40	11.5	12.9	14.5	15.3	16.2	18.3	21.3
50	10.9	12.3	13.8	14.7	15.5	17.6	20.5
60	10.3	11.8	13.3	14.1	15.0	17.0	19.9
70	9.9	11.3	12.8	13.6	14.4	16.4	19.4
80	9.4	10.8	12.3	13.1	14.0	16.0	18.8

Table 2. Equilibrium moisture content of soybeans (%wb) at different temperature and relative humidity levels (shaded area represents safe storage levels through March).

Temp.	Relative Humidity (%)						
F	40	50	60	65	70	80	90
40	7.7	9.3	11.3	12.6	14.2	18.9	28.6
50	7.6	9.1	11.1	12.4	14.0	18.6	28.2
60	7.4	9.0	10.9	12.2	13.7	18.3	27.8
70	7.3	8.8	10.7	12.0	13.5	18.0	27.4
80	7.2	8.6	10.6	11.8	13.3	17.7	27.0

Two other pieces of useful information to consider during harvest are the allowable storage time (Table 3) and the amount of time required to dry corn (Table 4). Cooler temperatures add to storage life, which has been about the only saving grace this fall. Use the information from tables 1 and 2 to predict similar conditions for soybeans. For example at 60 degrees and 70% humidity, soybeans at 13.7 percent moisture have a similar storage time as corn at 15.0 percent moisture, which is 120 days. Note in Table 4 that for some drying situations the amount of time required to dry the crop can exceed safe limits with the poor weather conditions typical in November and December.

Table 3. Allowable storage time in days for corn (Source: ASAE, 2000).

MC	Temperature				
%	40	50	60	70	80
16	*	230	120	70	40
17	280	130	75	45	20
18	200	90	50	30	15
19	140	70	35	20	10
20	90	50	25	14	7

Table 4. Approximate number of days needed to dry the top layer of corn to 17% moisture (Source: Granary, 1994).

	Temp/ RH = 60/80			Temp/ RH = 65/70		
MC	Airflow, cfm/bu			Airflow, cfm/bu		
%	1	2	3	1	2	3
19	32	16	11	26	13	9
20	39	20	13	30	15.6	10
21	47*	23	15	35*	17.5	11

* Excessive storage losses would be expected.

Another important piece of information needed to manage natural air drying systems is the amount of air the fan can provide for different depths in a bin. Table 5 shows an example of a typical 10 horsepower axial fan on a 36 feet diameter bin for both corn and soybeans. In this case, airflows of 3, 2 and 1 cfm/bu are possible at corn depths of 6.5, 9 and 16 feet, respectively, and soybean depths of 6.7, 9.6, and 18, respectively.

Table 5. Air delivered at different depths in a 36-ft bin with a typical 10 hp axial fan.

Depth	Corn			Soybean	
Ft	Bushels	CFM	cfm/bu	CFM	cfm/bu
2	1629	16,670	10.2	16,740	10.3
4	3257	16,200	5.0	16,460	5.1
6	4886	15,700	3.2	16,075	3.3
8	6514	15,300	2.4	15,730	2.4
10	8143	14,850	1.8	15,410	1.9
12	9772	14,425	1.5	15,080	1.5
14	11,400	14,470	1.2	14,735	1.3
16	13,030	13,730	1.0	14,420	1.1
18	14,657	13,340	0.9	14,140	1.0
20	16,286	13,000	0.8	13,880	0.9

The relevant point here is that corn at 20 percent moisture and 60 degrees will only have about 25 days to dry before some losses occur, so grain depths must be fairly shallow to provide enough airflow (greater than 2 cfm/bu) to dry the crop before sprouting or mold damage occurs. In the example given, once the top layer of corn is dried to 17 percent moisture (18 percent for soybeans), an 8-ft layer can be added to maintain an airflow of 2 cfm/bu. Cool all grains to 35 to 40 degrees to add storage life and consider either selling before next spring or finish drying then.

More information on different grain drying systems and their efficient operation is provided in Chapter 10 of the publication ID-139 "A Comprehensive Guide to Corn Management in Kentucky" (www.ca.uky.edu/agc/pubs/id/id139/id139.htm). Additionally, a list of publications that describe specific drying systems is provided in the document. These may be ordered from county extension offices or by calling Joyce Peel at 859-257-3000 x 111.

GREENHOUSE CROPS

Poinsettia Disease Alert

By John Hartman

The poinsettia crop growing in Kentucky greenhouses is well on its way to being ready for sale for the Christmas season. Recent samples examined in the U.K. plant disease diagnostic

laboratory suggest that some important poinsettia disease issues could arise in the crop. There are several diseases that can be problematic in greenhouse-grown poinsettia crops.

Figure 1. Poinsettia mosaic virus-infected leaf with yellow spots. One spot on left has a necrotic center. This symptom could be confused with early symptoms of scab.

Poinsettia Mosaic Virus - A recent occurrence of this disease was confirmed in the diagnostic lab. Scattered yellow spots were observed on leaves with some showing angular necrotic spots (Figure 1). The virus can also cause mosaic, mottle and distortion of leaves and bracts (Figure 2). Symptoms are more prominent on plants grown at cool temperatures (61° to 68°F) while plants grown at warmer temperatures (75° to 82°F) may not show symptoms. In greenhouses kept cool in October and then warmed up by recent mild weather infected plants could show normal-appearing new growth while older leaves have symptoms. This virus is mechanically transmitted and can be spread by hands and by tools.

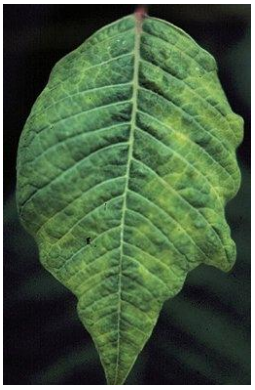

Figure 2. Poinsettia mosaic virus. (University of Wisconsin photo)

Bacterial Soft Rot - Infected cuttings become soft and mushy, usually starting at the base of the stem. Rotting tissues usually have a disagreeable odor. On older plants, stem decay may result in lodging. The disease is favored by the use of soft, succulent cuttings and warm, damp conditions.

Figure 3. Stem lesions on poinsettia caused by bacterial canker. (C. Kaiser photo)

Bacterial Canker - Longitudinal water-soaked streaks on stems (Figure 3) and spots on leaves precede plant defoliation and death. This disease is favored by warm, moist growing conditions and bacteria may be spread in splashing water.

Rhizoctonia Root and Stem Rot - This disease occurs on cuttings and young plants, causing a brown, dry canker at the stem base, and root browning. Depending on the level of infection, the roots may show individual brown lesions or they may be entirely brown. The disease is favored by planting too deep, injuring the stem while planting, or by soluble salts injury.

Pythium Root Rot - Rooted cuttings may be stunted and yellow with brown, decayed roots. Root cortex tissues (outer layers) are easily stripped off, leaving a narrow core of inner vascular tissue. In mid-season, Pythium invades roots made vulnerable by water stress or excess soluble salts, causing discoloration and decay of small absorptive roots. Loss of root function produces yellowing, wilting, and possibly death of infected plants, especially under stressful growing conditions.

Black Root Rot - Infected roots show black dead tips or distinct black bands or root lesions, and eventually blackened root systems as the disease progresses in late season. Diseased roots lead to stunting and poor growth of plants. This disease is favored by cool temperatures and high soil pH.

Figure 4. Botrytis blight causing dead patches on poinsettia bracts.

Botrytis Blight - Tan to gray-brown blotches on bracts (Figure 4) or target spot lesions on leaves appear on mature plants during periods of cool, cloudy, moist weather. Damaged areas may be covered by the fuzzy gray growth (spores) of the fungus. Botrytis may also cause stem blight (Figure 5) on cuttings and plants, often at branch crotches. Stem cankers cause

Figure 5. Botrytis stem rot. Notice gray mold growing on the base of the poinsettia stem.

defoliation and death of the distal plant parts. The Botrytis fungus can colonize dead plant tissues and produce large numbers of spores.

Figure 6. Poinsettia powdery mildew (University of Hawaii photo).

Powdery Mildew - Yellow spots may develop on leaves. Patches of white fungal growth may be seen on leaves and bracts (Figure 6). This disease appears first on crowded, shaded foliage.

Figure 7. Poinsettia scab causing leaf blotch.

Poinsettia Scab - Leaves develop small, raised blister-like tan or brown circular spots that may expand to dead blotches (Figure 7). Gray to tan lesions appear on stems (Figure 8) and infected young stems may be visibly elongated compared to healthy stems. Fungal spores can be spread from plant to plant in splashing water.

Figure 8. Poinsettia scab causing stem lesions.

Disease Management - Disease control is best done through prevention using an integrated program involving sanitation, cultural control, and chemical fungicides.

Sanitation - Cleaning up and discarding diseased plant material is important for control of any greenhouse crop disease, and poinsettia is no exception. Disease-causing fungi and bacteria survive in plant debris from the previous crop, and in soil and water left on floors, benches and equipment or the microbes are brought into the greenhouse. Sanitize by doing the following:

- Remove pathogen-infested plant debris and soil from the greenhouse.
- Clean and disinfest the benches and equipment with a germicide.
- Root cuttings in well aerated, sterilized rooting medium.
- Transplant rooted cuttings into sterilized soil mix.
- Regularly collect organic debris such as shed leaves or bracts or declining plants and remove from the greenhouse.
- Pick off and destroy diseased leaves as they appear.

Cultural practices - Crop management influences poinsettia diseases. The following practices can help reduce disease in the greenhouse:

- Reduce nitrogen fertilization to harden plants before taking cuttings.
- Inspect purchased cuttings and reject those that are diseased.
- Handle cuttings carefully and plant at the correct depth.
- Maintain optimum growing conditions.
- Monitor mineral nutrient levels regularly through soil testing. Common problems causing infectious disease-like symptoms include low calcium compared to potassium and magnesium or calcium-ammonium antagonism (marginal bract spots), magnesium deficiency (interveinal leaf yellowing), and molybdenum deficiency (lower leaf yellowing, burning, and downward cupping.
- Avoid ammonium toxicity (lower leaves yellow with marginal burn) due to excess use of ammonium nitrate fertilizer, low soil pH, and over watering.
- Watch for and correct soluble salts and over or under watering problems.
- Provide plant spacing that allows good air movement.
- Avoid splashing water on foliage.

- Use greenhouse ventilation systems to maintain low humidity.

Chemical Control - Fungicides applied preventively and regularly to poinsettias can help control many of the diseases, however, chemical applications must be combined with good sanitation and cultural practices. Many fungicides are used as soil drenches. Fungicide drenches should thoroughly wet the growing medium. Read and follow label directions. The following fungicides may be used for poinsettia disease control:

Black root rot - Banrot, Cleary's 3336, Domain, Fungo, Medallion.

Botrytis gray mold - Chipco 26019, Cleary's 3336, Daconil 2787, Domain, Fungo, Exotherm Termil, Ornalin.

Powdery mildew - AQ 10, Benefit, Chipco 26019, ConSyst, Cygnus, Duosan, Phyton 27, Pipron, Sunspray, SysTec 1998, Systhane, Terraguard, Triact, Zyban.

Pythium root rot - Banol, Banrot, Subdue, Subdue Maxx, Terrazole, Truban.

Rhizoctonia stem and root rot - Banrot, Chipco 26019, Contrast, Medallion, Terrachlor, Terraguard.

Scab - Compass, Duosan, Compass, Phyton 27, SysTec 1998, Systhane, Zyban.

HOUSEHOLD INSECTS

Multi-colored Asian Lady Beetle Flights Underway
By Mike Potter

Here are some points to keep in mind as these insects move to wintering sites:

1. Lady beetle flights are heaviest on warm sunny days (after a period of cold weather) when temperatures climb above 60 degrees F. They tend to congregate initially on the sunnier, southwest sides of buildings in mid-afternoon. Structures that are shaded and not brightly illuminated by afternoon sun are less likely to attract the beetles.
2. Once the beetles alight, they attempt to enter crevices and other dark openings in search of hibernation sites. These locations may be anywhere on the structure, but especially beneath exterior siding, around window and doorframes, soffits, fascia boards, and through weep holes and attic or crawl space vents. Sealing exterior cracks and openings with caulk, screening, weather stripping, etc., is the most effective long-term, prevention against beetle entry. (See ENTFACT-641 How to Pest-Proof Your Home.)
3. Once the beetles are indoors, the best way to remove them is with a vacuum cleaner. When brushed or handled the beetles often secrete a yellowish-orange fluid, making vacuuming a better option for indoor removal than brooms, mops, etc. Insecticides applied indoors tend to be ineffective and may stain or leave unwanted residues on walls, counter tops, and other surfaces.
4. While sealing exterior openings is the more permanent means of denying ladybug entry, pest proofing is time-consuming and impractical for many clients. If a household or business continues to be troubled by lady beetles, owners may want to enlist the services of a professional pest control firm. Some companies offer pest proofing services and many offer insecticide treatment of the building exterior, which helps to prevent pest entry. Fast-acting, "professional strength" pyrethroid formulations (e.g., Demand, Suspend, Talstar, Tempo) tend to be most effective, and can be applied around eaves, attic vents, windows, doors, underneath siding, and other likely points of entry. Homeowners insistent upon applying exterior treatments themselves will usually get the most for their efforts using over-the-counter versions of these products such as Spectracide Triazicide or Bayer Advanced Powerforce Multi-Insect Killer. Purchasing the concentrated formulations of these products that can be diluted will enable the homeowner to mix up and apply larger

volumes of material with a pump-up or hose-end sprayer. In order to have any benefit, exterior treatments must be applied before the beetles enter buildings to overwinter.

5. When all else fails, customers should be reminded that lady beetle entry into buildings is a relatively short-term event which generally runs its course by mid-November. The beetles sometimes emit a foul odor, stain indoor surfaces, and occasionally give a "nip" if they land on one's skin. They do not breed or reproduce indoors like fleas or cockroaches, and constitute a nuisance mainly by their presence.

PESTICIDE NEWS

Carbofuran (Furadan) Cancellation Process and Challenge
By Lee Townsend

The Environmental Protection Agency is moving forward to implement its final rule revoking carbofuran tolerances. EPA continues to find that dietary exposures to carbofuran from all sources combined are not safe. After requesting and considering public comment, EPA revoked carbofuran tolerances, the regulations that allow carbofuran residues in food, in May 2009 due to considerable risks associated with this pesticide in food and drinking water. During the objection period, the carbofuran registrant, FMC Corporation, and three grower associations (corn, sunflowers and potatoes) submitted objections to EPA's tolerance revocations and requested an administrative hearing.

EPA has concluded that the regulatory standard for holding an evidentiary hearing has not been met. EPA's detailed explanation about why a hearing is not warranted, and the reasons for denying the objections are included in a Federal Register Notice signed October 30, 2009. EPA encourages growers to switch from carbofuran to safer pesticides or other environmentally preferable pest control strategies. Since the tolerances are being revoked, EPA reminds growers that carbofuran should not be used on any food crops after December 31, 2009. Use of carbofuran after this date would result in adulterated food products, which would be subject to appropriate enforcement by the Food and Drug Administration.

EPA's May 2009 action to revoke all carbofuran tolerances effective December 31, 2009, was the culmination of a regulatory process that began in 2006 when the Agency published its risk assessments for carbofuran and determined, in August 2006, that no uses were eligible for reregistration. While FMC has voluntarily canceled 22 carbofuran uses, the elimination of these uses was not sufficient to allow the Agency to make a finding that combined dietary exposures to carbofuran from food and water are safe. The process to cancel the remaining carbofuran registrations is underway and will address risks to pesticide applicators and birds in treated fields.

EPA establishes tolerances for pesticides that may be found on foods, and can also revoke tolerances to better safeguard public health and the environment. The Agency must modify or revoke any tolerance that it determines is unsafe, that is, that does not meet the safety standard of the Federal Food, Drug, and Cosmetic Act (FFDCA). The Agency has revoked all tolerances for carbofuran because exposure through food and drinking water combined does not meet the FFDCA section 408 (b)(2) safety standard.

Go to
http://www.epa.gov/opp00001/reregistration/carbofuran/carbofuran_noic.htm#revocation for more information from the EPA.

FMC Corporation announced (Oct 30, 2009) that the company plans to challenge the EPA's decision to deny an administrative hearing on the agency's action to revoke all U.S. food tolerances for carbofuran insecticide. The company and a group of U.S. crop commodity associations will take legal action in U.S. federal court.

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UNIVERSITY OF KENTUCKY
College of Agriculture

Entomology Department
Ag Distribution Center
229 Stadium View Road
Lexington KY 40546-0229

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