Purdue Cooperative Extension Service

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In This Issue

Purdue Extension Field Crop Specialist Listing is included with this issue.

Weeds

2010 Herbicide Update – (*Glenn Nice, Bill Johnson, Tom Bauman, and Tom Jordan*)

This article is meant to provide information on new products in the upcoming year. This article is the companion of the "Weed Science Update" presentations that your weed science team gives throughout Indiana as part of the Pesticide Applicators Recertification Programs. In this article all registered trade names will be presented in bold and all rates are per acre.

BASF

Kixor – [saflufenacil, group 14*].

Labeled in Indiana. **Kixor** is the brand name for a family of herbicides that include saflufenacil. This active ingredient is in the group 14 herbicides with a mode of action similar to **Authority** and **Valor**. Saflufenacil has both foliar and soil activity and must be applied before crop emergence. Work done at Purdue with saflufenacil has demonstrated that it has burndown activity on horseweed/marestail, ragweeds, lambsquarter, velvetleaf, pigweed, and waterhemp. The herbicide **Sharpen** is saflufenacil alone. **OpTill** is saflufenacil + **Pursuit**, and **Integrity** is saflufenacil + **Outlook**. See below for information regarding these specific products.

Sharpen – [2.85 lb ai/gal saflufenacil, group 14*].

Labeled in Indiana. **Sharpen** is labeled for use in corn (coarse soil texture 2 fl oz, medium 2.5 fl oz, and fine 3 fl oz), soybean (1 oz all soil types), and small grains (2 fl oz). If applying before soybean on a coarse textured soil with 2.0% organic matter or less, applications have to be made 30 days or more before planting. The soybean rate may provide suppression of broadleaf weeds, but should be mixed with other residual herbicides. As mentioned above **Sharpen** has burndown activity on several annuals, however it is weak on grasses and it will need a tank-mix partner that has activity on grasses (Table 1). Burndown applications should be made with a methylated seed oil (MSO) or crop oil concentrate (COC) at 1% v/v. For burndown purposes

Table 1. Sharpen control alone and with tank mixes 30 days after application

Treatment	Rate/A	Giant Ragweed	Giant Foxtail	Lambsquarter
		---------- % ----------		
Sharpen	2.5 oz	95	77	86
+ Outlook	10 oz	100	100	99
+ Balance Pro	1.5 oz	88	100	100
+ Dual II Magnum	0.88 pt	100	100	96
+ Guardsman Max	2.5 pt	100	100	100
+ Prowl H_2O	2 pt	98	100	100

only **Sharpen** can be applied at 1 fl oz to all soil types. At this rate soil activity is limited. When tank-mixing with a glyphosate product use ammonium sulfate (AMS) at 8.5 to 17 lb/100 gal. Do not use within 30 days of other PPO (group 14) herbicides. These include such herbicides as **Valor**, **Resource**, **Flexstar**, **Reflex**, **Ultra Blazer**, **Cobra**, and others.

OpTill – [0.178 lb/gal saflufenacil + 0.502 imazethapyr, groups 14 and 2*].

Labeled in Indiana. **OpTill** is labeled for preemergence applications in **Clearfield** corn and any type of soybean at 2 oz. The premixing of the **Pursuit** component will provide increased grass control.

Integrity – [0.57 lb ai/gal saflufenacil + 5.0 lb ai/gal dimethenamid, groups 14 and 15*].

Labeled in Indiana. **Integrity** is the third product that contains saflufenacil. However in this case it is only labeled for corn or popcorn at 10 (coarse soil texture), 13 (medium), and 16 (fine) fl oz. Similar to **OpTill** the added **Outlook** component increases grass control (Table 2.). The pre-mix can also increase black nightshade control from **Sharpen** alone. COC or MSO should be added to increase burndown activity of already emerged weeds.

Bayer CropScience

Balance Flexx - [2 lb ai/gal isoxaflutole + cyprosulfamide, group 28*].

Balance Flexx has the same active ingredient as **Balance Pro** with an additional safener that increases corns ability to metabolize isoxaflutole. This reduces the risk of injury to the corn allowing for early postemergence applications from spike to V2 corn. Tank-mixing with atrazine to control emerged weeds above the first true leaf is recommended. See table 2 for a rate comparison between **Balance Pro** and **Balance Flexx**. When considering rates, the **Balance Pro** label provides a rate range where **Balance Flexx** gives a single rate for the resspective soil type. The amount of active ingredient applied is similar.

Capreno – [2.88 lb ai/gal tembotrione + 0.57 lb ai/gal thiencarbazone-methyl, group 28 and 2*].

The new ALS inhibitor active ingredient thiencarbazone-methyl plus the active ingredient found in **Laudis** makes up **Capreno**. **Capreno** is labeled for field corn, popcorn, sweet corn and seed corn from V1 to v6. Apply at 3 fl oz/A with COC at 1% v/v and UAN at 1.5 lb/A or AMS at 8.5 lb/100 gal. Some inbred corn may be less tolerant to **Capreno**, it is a good idea to consult your seed company before use. If tank mixing with **Ignite** use 2 fl oz/A **Capreno** and 22 fl oz of **Ignite** and only use AMS as an adjuvant. Good to excellent control of annual grasses and broadleaves. Morningglory control is fair.

Corvus – [1.88 lb ai/gal isoxaflutole + 0.75 lb ai/gal thiencarbazone-methyl + cyprofulfamide, group 28 and 2*].

Labeled in Indiana. **Corvus** is a pre-mix of thiencarbazone-methyl and isoxaflutole (**Balance**) and a safener. Labeled in field corn, **Corvus** can be applied up to 30 days before planting when used in a pre + postemergence program and as late as V2 corn with atrazine. For increased burndown activity, use COC or MSO with applications of **Corvus** before emergence of corn. Do not apply with adjuvants if corn is emerged. In Indiana the typical use rate will be 5.6 fl oz/A. However, if you are on a coarse soil with an organic matter of 2% or less the maximum use rate will be 3.33 fl oz/A. Do not apply to corn that received soil or seed treatments of organophosphates or carbamate insecticides.

In studies conducted by Bill Johnson and Tom Bauman at Purdue University, **Corvus** + atrazine performed similar to **Balance Flexx** + atrazine or Lexar in controlling marestail (horseweed), dandelion and common cocklebur 66 days after application[Johnson 2008, Bauman 2009]. Applied without atrazine, Corvus has slightly better preemergence control of annual grasses, and better control of giant ragweed than **Balance Flexx**.

Table 2. Rate comparison between Balance Pro and Balance FLEXX

		Soil Texture					
		Coarse		Medium		Fine	
Herbicide	Timing	<1.5%	>1.5%	<1.5%	>1.5%	<1.5%	>1.5%
		----------fl oz ----------					
Balance Pro	8 to 30 DBP*	Do not use	2.2-3 (1.1-1.5)**	3-3.7 (1.5-1.8)	3-3.7 (1.5-1.8)	3.7-4.5 (1.8-2.2)	3.7-4.5 (1.8-2.2)
	0 to 7 DBP	Do not use	1.5-1.8 (0.75-0.9)	1.8-2.6 (0.9-1.3)	2.2-3 (1.1-1.5)	2.2-3 (1.1-1.5)	2.2-3.7 (1.1-1.8)
Balance FLEXX	8 to 21 DBP	4 (1)	5 (1.25)	6 (1.5)	6 (1.5)	6 (1.5)	6 (1.5)
	0 TO 7 DBP	3 (0.75)	4 (1)	5 (1.25)	5 (1.25)	6 (1.5)	6 (1.5)

*DBP stands for 'days before planting.'
**Active ingredient delivered in oz.

DuPont

Prequel – [15% rimsulfuron + 30% isoxaflutole, group 2 and 28*].

Labeled for field corn, **Prequel** is a combination of **Resolve** and the same active ingredient as **Balance Pro**. **Prequel** can be used at 1.66 oz and provides residual control of grasses and broadleaf weeds in a preemergence followed by postemergence program.

Syngenta

Flexstar GT – [0.66 lb ai/gal fomesafen + 2.63 lb ae/gal glyphosate, groups 14 and 9*].

Apply preplant surface, preemergence, in soybean or postemergence in RR soybean at rates between 3 and 4.5 pts/A depending where you are in the state. Like **Flexstar**, **Flexstar GT** has a regional maximum rate structure. In Indiana, the maximum rates are based on whether you are north or south of interstate 70. If you are applying **Flexstar GT** north of I-70 the maximum amount that you can apply a year is 3.75 pts, if you are applying south of I-70 the maximum rate is 4.5 pts/A. Typically adjuvants are not necessary unless you have a) adverse growing conditions (drought or cold stressed weeds), b) glyphosate-resistant weeds, c) or weeds known to be difficult to control with both **Flexstar** and glyphosate. In Indiana it is recommended to add AMS at 8.5 to 17 lb/100 gals. Keep in mind that **Flexstar GT** has a 10 month rotation restriction for field corn and a 12-month rotation restriction for popcorn. If you are planning on rotating to sorghum you will have to wait 18 months.

Generic Products

There are several generic products available this year (Table 3). This is by no means an all inclusive list, but a list of some of the generic products available in 2010.

*For more information regarding herbicide groups please see "Weed Control Principles" in the 2010 Weed Control Guide <http://www.btny.purdue.edu/Pubs/WS/WS-16/WeedControlPrinciples.pdf>.

Table 3. List of available generic herbicides. This was adapted from the 2010 Weed Control Guide for Ohio and Indiana

Active Ingredient	Brand Name - Company	Generic (lb ai/gal or %)	Company
acetochlor		**Volley** (6.4)	Tenkoz
acetochlor + safener	**Degree** (3.8), **Harness** (7) - Monsanto **Topnotch** (3.2), **Surpass** (6.4) - Dow AgroSciences	**Cadence** (6.4) **Confidence** (7)	UAP Loveland Winfield Solutions
acetochlor + atrazine		**Volley ATZ**	Tenkoz
acetochlor + atrazine + safener	**Degree Xtra** (3.8) **Harness Xtra** (5.6) - Monsanto **Fultime** (4) - Dow AgroSciences	**Cadence ATZ** (5.25) **Confidence Xtra** (5.6)	UAP Loveland Winfield Soluions
alachlor	**Lasso** (4) **IntRRo** (4) **Micro Tech** (4) - Monsanto	**Alachlor** (4)	Micro Flo
bromoxynil	**Buctril** (2) - Bayer CropScience	**Broclean** (2) **Moxy** (2)	UAP - Platte Riverside
bromoxynil + atrazine	**Buctril/atrazine** (3) - Bayer CropScience	**Brozine** (3)	UAP - Platte
clethodim	**Select Max** (1) **Select** (2) - Valent	**Arrow** (2) **Intensity** (2) **Intensity One** (1) **Section** **Volunteer** (2)	Makhteshim-Agan UAP - Platte UAP - Platte Winfield Solution Tenkoz
chlorimuron-ethyl + metribuzin	**Canopy DF** (75%) - DuPont	**Cloak DF** (75%)	Nufarm
chlorimuron-ethyl + tribenuron	**Canopy EX** (29.5%) - DuPont	**Cloak EX** (29.5%)	Nufarm
dicamba	**Banvel** (4) - MicroFlo **Clarity** - BASF	**Oracle** (4) **Rifle** (4) **Sterling Blue** (4)	Gharda USA UAP Loveland Winfield Solutions
dicamba + atarzine	**Banvel-K + atrazine** (3.2) - MiroFlo **Marksman** (3.2) - BASF	**Rifle Plus** (3.2)	UAP Loveland
dicamba + 2,4-D	**Banvel + 2,4-D** - (3.87) MicroFlo	**Brash** (3.87) **Latigo** (4.2) **Outlaw** (2.54) **Rifle - D** (3.87)	Windfield Solutions Helena Helena UAP Loveland
fluroxypyr + clopyralid	**WideMatch** (1.5) - Dow AgroSciences	**Colt** (1.5)	UAP Loveland
fomesafen	**Reflex** (2) **Flexstar** (1.88) - Syngenta	**Rhythem** (1.88) **Dawn** (2)	Cheminova Cheminova
halosulfuron	**Permit** (75%) - Gowan	**Halomax** (75%)	Aceto
metribuzin	**Sencor** (75%) - Bayer CropSciences	**Metribuzin** (75%)	Makhteshim Agan
s-metolachlor + safener	**Dual II Magnum** (7.8) - Syngenta	**Stalwart C** (7.8) **Brawl** (7.64) **Charger Max**	Sipcam Agro USA Tenkoz Winfield Solutions
s-metolachlor + atrazine + safener	**Bicep II Magnum** (5.5) - Syngenta	**Stalwart Xtra** (5.5) **Trizmet II** (5.5)	Sipcam Agro USA Rosens
nicosulfuron	**Accent** (75%)	**NIC-IT** (75%)	Cheminova
thifensulfuron	**Harmony SG** (50%) - DuPont	**Harass** (75%)	Cheminova
thifensulfuron + tribenuron	**Harmony Extra TotalSol** (50%) - DuPont	**Nimble** (75%)	Cheminova
tribuenuron	**Express TotalSol** (50%) - DuPont	**Nuance** (75%)	Cheminova
triclopyr + 2,4-D	**Crossbow** (3) - Dow AgroScience	**Crossroads** (3)	Albaugh

A Little Burndown Madness – (*Glenn Nice, Bill Johnson, and Tom Bauman*)

If you are a no-tiller then you are probably considering your burndown options for this year. Your burndown herbicides can be applied with your early pre-plant or separate. However, it is important to have a clean slate for the up coming planting season. A wooly field interferes with planting and planting timing. Some of the products that you might want to consider for a burndown program this coming season are listed in the table below.

Glyphosate or paraquat (Gramoxone inteon) can be applied almost any time before planting in the spring, however allow 7 to 10 days for glyphosate to do its job. Due to the widespread occurrence of glyphosate resistant horseweed (marestail) it is recommended to mix at least 1 pt/A 2,4-D ester with your burndown. When using 2,4-D at 1 pt/A or less (< 0.5 lb ai/A) you have to wait 7 days before the planting of soybean. If you use more than 1 pt/A (>0.5 pt ai/A), most labels specify a 30 day preplant interval. Extreme, Canopy DF, or Canopy EX can only be used before soybean. Simazine can only be used before corn. Atrazine, Sencor, Scepter, and FirstRate will have some burndown ability when COC is added to the mix. Always read and follow pesticide labels.

The following websites are the burndown section available in The Weed Control Guidelines for Ohio and Indiana <http://extension.entm.purdue.edu/pestcrop/2010/issue1/Burndown.pdf>. The Weed Control Guidelines for Ohio and Indiana are available on the Web at <http://www.btny.purdue.edu/Pubs/WS/WS-16/>.

Plant Diseases

Safety First! Tips for Safely Handling Moldy Corn - *(Kiersten Wise, Charles Woloshuk, and William Field, Botany & Plant Pathology Dept and Ag. & Biological Engineering Dept)*

Many grain bins across Indiana are filled with corn that has some level of damage due to preharvest fungal ear rots. Grain harvested from fields that were affected by Gibberella ear rot may also be contaminated with mycotoxins. Producers are primarily concerned with how to market and store this damaged grain, but there are also concerns about the potential human health hazards that may result from handling this grain.

Breathing grain dust is never healthy, and grain handlers should always wear protective masks when they work in grain bins, and when conducting operations that generate dust. Grain damaged by ear rots will have higher levels of dust and fines present, compared to good quality grain. Fungal spores produced by the ear rot fungi will also be in the grain dust. Fortunately, the fungus that causes Gibberella ear rot does not produce a lot of spores. However, there will certainly be spores of other molds in the grain dust. These spores can lead to allergic reactions, which may include flu-like symptoms, if workers do not take precautionary measures to protect themselves from exposure.

The mycotoxins vomitoxin (DON) and zearalenone, may be present in grain affected by Gibberella ear rot. These mycotoxins are not volatile molecules, so contaminated grain will not emit a toxic gas. However, the toxins will be in the small particles of corn dust and fines associated with the contaminated grain. If grain handlers are not wearing protective masks when working with this grain, they can breathe this contaminated dust into their lungs, and toxic effects may result from this exposure. Even if mycotoxins are not present in the grain dust, extensive exposure to dust may lead to eventual illness.

Simple safety procedures can be implemented to minimize exposure to grain dust and mold spores. When working with moldy grain, wear appropriate clothing such as long sleeves, pants, and gloves. A dust mask or respirator should also be worn to minimize inhalation risks. People who have a compromised immune system or respiratory ailments should avoid handling or working with moldy grain.

The Grain Quality Task Force at Purdue University has an excellent article reviewing grain handling and safety procedures for farm operators. Please contact Bill Field at <field@purdue.ed> for a copy of this article or download a PDF version here.

Related References

Wise, Kiersten, Charles Woloshuk, and R.L. (Bob) Nielsen. 2010. Choose Wisely……Avoid unprofitable strategies to manage moldy grain. Corny News Network, Purdue University. Online at <http://www.kingcorn.org/news/articles.10/MoldyGrain-0208.html>. [URL accessed Feb 2010].

Woloshuk, Charles and Kiersten Wise. 2009. Diseases of Corn: Diplodia Ear Rot. Purdue Extension publication BP-77-W. Online at <http://www.extension.purdue.edu/extmedia/BP/BP-75-W.pdf>. [URL accessed Feb 2010]

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Bits & Pieces

Storing Corn from the Fall 2009 Harvest – (*Richard Stroshine, Professor, and Matt Roberts, Agricultural and Biological Engineering Dept.*)

The wet conditions that created challenges for farmers during the fall harvest have also increased the potential for problems with storing the fall 2009 corn crop. Higher moistures mean there was more physical damage to many of the kernels during shelling along with more fine material. Both these factors increase susceptibility to invasion by storage mold and insects. Corn also had to be dried more aggressively to remove the extra moisture. That further increased the susceptibility of the corn to breakage and to storage mold while increasing the potential for wet pockets of corn in the bins. Higher levels of ear rot damage also make corn more susceptible to invasion by other storage molds and contribute to above normal percentages of fine material. The "bottom line" is that last year's corn crop will be more difficult to store and it should be monitored more closely. There are several steps that farmers can take to reduce the risk of mold growth during storage or to detect mold growth early so that losses can be minimized.

Moisture Monitoring and Drying

The moisture content of the corn in storage should be checked to ensure that it is being stored at the proper moisture. There are several reasons why the moisture may be higher than expected. When 5 to 10 points of moisture are removed during high temperature drying, the moisture distribution within kernels is uneven. Immediately after drying moisture meters can read as much as 2 points below the actual moisture, which can be determined more accurately after waiting at least 24 hours for the moisture to be distributed evenly throughout the kernels. Other conditions may have developed that caused condensation of moisture on the grain surface. Or there may have been condensation on the bin roof that dripped down onto the grain surface. Now that ambient temperatures are increasing, corn that is above 15% moisture should be marketed or dried as soon as possible. When stored beyond late April, corn should be dried to 14.5% or below. Storing corn 0.5 to 1.0 percentage points below these levels will further reduce the potential for fungal growth.

Monitoring and Temperature Control

Mold growth produces heat which in turn increases grain temperature. Therefore, the temperature of stored grain should be checked once every two weeks during the winter and once each week starting in early March. For bins without temperature cables, a temperature probe can be purchased that can be pushed into the grain to a depth of several feet. Or a metal rod can be inserted into the grain and allowed to equilibrate for several hours. If the rod was in contact with grain in which there was significant microbial activity, it will feel warm when it is removed. The rod should be inserted many places in the bin because grain is a good insulator and grain several feet from a hot spot may still be cool. Greater attention should be given to regions of the bin where fine material tends to collect such as the center beneath the spout line. The corn should have been aerated during the fall and early winter to reduce its temperature to between 30 and 40ºF. Many farmers hold their corn at this temperature unless it will be stored into mid-summer. Condensation can develop on cold grain in contact with warm humid air. Therefore it should be monitored for mold growth by regularly checking grain temperatures until the grain is utilized or sold. Corn being held for long term storage can be aerated to increase its temperature to 50ºF. One note of caution: if cold grain is aerated with warm, humid air moisture may condense at the point where ambient air first enters the corn (at the bottom of the bin when positive pressure aeration systems are used).

Fine Material Management

Fine material inhibits the movement of airflow during aeration allowing hot spots to develop within the grain mass. If mycotoxins are present in the corn, fines will often contain higher levels of these toxins. One reason for this is that the mold damaged kernels tend to break up more during harvesting and handling. Therefore removal of fine material prior to binning will reduce the threat of grain spoilage. Fine material collects beneath spout lines and is usually higher near the center of the bin, even when a centrifugal grain spreader is used to fill the bin. For this reason it is good practice to "core" each and every bin by opening the center well above the unloading auger and removing one or more loads of corn. This is even more important if there is a "peak" at the top of the bin. This peak will interfere with aeration and compound problems caused by concentrations of fine material, which are usually found beneath that peak. Coring will also give the farmer an opportunity to examine the quality of corn in the bin and detect deterioration if it is developing. When corn is removed from the bin it should always be removed from the center first because uneven distribution of corn during loading can cause the bin to shift or even to buckle.

Additional information on managing and monitoring stored corn can be found at Purdue's Grain Quality website <http://www.grainquality.org>. Publications that discuss grain storage practices include AE-90 Managing Grain for Year-Round Storage and AED-20 Managing Dry Grain in Storage.

Grain Storage Problems Are Increasing the Dangers to Farm Operators - (*William E. Field, Department of Agricultural and Biological Engineering*)

Not all is well with the 2009 corn crop that is in storage, and that poses more than just a financial threat to farmers. Late harvest, immaturity, high moisture levels at harvest, high humidity levels, and in some areas inappropriate drying techniques and storage practices have led to unusually high amounts of poor quality corn. The result has been corn that has crusted because of excessive heating and mold damage.

Such grain spoilage increases the personal danger to farmers who are trying to remove the 2009 corn crop from storage. Since the 2009 corn crop has been put into storage, there have been at least a half dozen reported deaths due to grain entrapment. Most have involved removing grain from storage and one involved a wagon load of crusted grain that flipped over when it became unbalanced during unloading, burying the farmer underneath the remaining grain. In addition, conditions that encourage mold growth have increased the potential for exposure to high concentrations of mold spores that can lead to severe respiratory illnesses.

Flowing Grain Entrapments

Generally, stored grain presents few hazards, but flowing grain increases the risk of entrapment and suffocation. Over the years, hundreds of deaths have occurred in bins that appeared to pose no danger. An unsuspecting farmer who enters a grain bin with the unloader running may be caught in the grain flow before realizing what has happened. It takes only four or five seconds for a person to submerge to the point where he or she is helpless. And it takes fewer than 20 seconds to be completely submerged in flowing grain at the center of the bin. Flowing grain entrapments fall into four primary categories:

1. **Engulfment in a Flowing Column of Grain**

Entrapment or suffocation most often occurs when an individual enters a bin during the unloading process and is drawn into a flowing column of grain. As the bin empties out the bottom, a rapidly moving column of grain forms over the outlet. This vertical column of grain acts somewhat like a fluid, and it flows down through the grain mass at nearly the rate of the unloading auger.

The rate of flow at the center top of a bin is so great that once a person is trapped in the flow, escape is impossible. Once engulfed in the flow of grain, the victim is rapidly drawn to the floor of the bin. The potential of entanglement with the bottom unloading auger is also a possibility.

2. **Collapse of Horizontal Crusted Grain Surface**

Entrapments and suffocations are possible when an individual enters a bin in which the surface of the grain has become caked because of spoilage. The surface appears solid, but can, in fact, be a thin crust concealing a void that forms as the grain is removed. The victim breaks through the crust and is quickly covered by the avalanche of grain collapsing into the cavity. Often the unloading equipment is still operating, which causes the victim to be pulled even deeper into the grain mass.

3. **Collapse of Vertical Crusted Grain Surface**

On occasion, farmers have been buried beneath a collapsed wall of free-standing grain. Dry grain in good condition will pile at a 30 degree angle, but spoiled or caked grain can stand almost vertical. As grain is removed from the base of a caked mass, the potential for an avalanche and engulfment increases. This type of engulfment also can take place inside bins where the spoiled grain is clinging to the bin walls. Attempting to remove these chunks of grain from below using a long pole can be extremely dangerous.

4. **Entrapment or Suffocation in Grain Transport Vehicles**

The risk of engulfment also is present around any grain transport vehicles such as wagons and trucks. With the high-volume capacity of many on-farm storage facilities, it is not difficult to imagine someone being covered over in seconds during an unloading operation. Many of the victims of this type of suffocation, historically, have been children.

At least two deaths have been reported that involved a wagon load of grain that flipped over onto the operator during unloading. This was caused by crusted grain stacked up on one side of the wagon causing the unit to be unbalanced.

Preventing Flowing Grain Entrapments

Suffocation and entrapment in grain storage facilities don't have to happen. The following safety tips are designed to protect you and others.

- ❖Never enter a bin when unloading equipment is running, whether or not grain is flowing from the outlet.
- ❖Keep children off grain vehicles and out of bins. These locations completely inappropriate play areas. Never transport children in empty hopper wagons or grain trucks. Grain flow can cover them quickly, before they or the combine operator realizes what is happening.
- ❖Don't enter a bin with automatic unloading equipment without locking out the control circuit.
- ❖Be especially cautious when working with grain that has gone out of condition. Dangers result from molds, blocked flow, cavities, crusting, and grain avalanches. Never work alone!
- ❖Beware of steep piles of grain. Dislodge them from above, if possible, with a long pole, rather than with a short shovel.

- ❖Never rely on a second person outside the bin, to whom you shout instructions. Equipment noise may block out or garble your calls for action or help. The second person may fall or stumble in the panic and haste of climbing and running to shut down the equipment.

- ❖Always have three people involved when entering a questionable storage situation. Utilize a safety harness and life line. Two adults outside are needed to lift one from the inside on a rope and safety harness if a problem develops. One can go for help while the other gives preliminary aid.

- ❖Always be cautious before walking on any crusted surface of grain. A break-through can plunge you into flowing grain with little chance of survival. Use a long pole from outside the bin to test grain surfaces.

Respiratory Hazards

Even a small amount of spoiled grain can produce millions of tiny mold spores, which easily become airborne when disturbed. Airborne mold spores can be inhaled through the nose and mouth, irritating sensitive lung tissue and in some individuals causing reactions so severe that hospitalization is necessary. Farmers working without respiratory protection inside a bin or other grain storage facility in which moldy grain is present are especially vulnerable to mold reactions.

When handling any grain where mold damage is present, the use of an appropriate respirator is essential. This applies even to truckers, scale operators, and those supervising the dumping operations at an elevator. After exposure to high concentrations of mold spores, it is important to change clothing (or use disposable overalls) to avoid bringing the mold spores home and exposing family members. If you do become ill after exposure to moldy grain, consult your physician and make him or her aware of your activities. Medical attention may be necessary in some cases.

Preventing Falls

The more frequently a farmer has to climb and enter a bin to complete the unloading, the greater the risk of falling. It is likely that the greater level of storage problems this year will result in more injuries from slips and falls around bins and transport equipment. The potential for falls can be reduced by:

- ❖Installing appropriate ladders inside and outside all bins. Avoid the use of portable ladders. Installing resting platforms at the top of each ladder to ease the transfer onto the bin roof or into the bin hatch.

- ❖Installing ladder cages, if possible, on all outside ladders over 30 feet high.

- ❖Keeping shoes free of mud when climbing bin ladders. If conditions are icy, delay access if possible.

- ❖Installing access ladders on trucks and using tarp rollers to reduce the need to climb on trucks.

If Someone Is Entrapped in Flowing Grain ...

If someone does become entrapped in flowing grain, an appropriate response is critical if there is to be any chance of survival. First shut off all equipment, then call for emergency assistance. Make sure that the dispatcher is informed of the nature of the accident, specific location, and directions if needed. If the bin is equipped with an aeration blower, turn it on to increase the flow of air through the bin. This may help the entrapped person to breathe. While waiting for the emergency rescue units, assemble any equipment that will assist with the rescue. This would include front-end loaders, shovels, plywood for coffer dams, and portable augers.

The only successful technique for removal of a person submerged in grain is to cut the bin and remove the grain from around the victim. This should be accomplished by the trained rescuers and after careful consideration of the structure involved.

For more information on grain bin rescue, consult NRAES-10, Farm Accident Rescue, which is available from: *Purdue Extension - The Education Store, 231 S. University St., SERV Bldg., Purdue University, West Lafayette, IN 47907-2094 or call (765) 494-6794 or Toll free: 888-398-4636, ext. 46794.*

Summary

All of the grain in storage is not worth the life of one farmer, and there is no reason that there ever should be another victim of a flowing grain entrapment.

If everyone involved is patient and follows the few basic strategies outlined above, not only will the 2009 crop reach the market safely, but everyone involved also will be around to enjoy the rewards from its sale.

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