

UNIVERSITY OF KENTUCKY WHEAT SCIENCE NEWS



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PROTECTING STORED SEED FROM INSECTS Doug Johnson—Extension Entomologist

Protecting stored seed is a somewhat different task from protecting stored grain/seed in the food /feed system. The same insects attack the seed and some of the tools for prevention and control are the same. However, several of the tools are different and the type of protection needed is different.

There are two general groups of insecticides available for protecting stored seed. The first group is labeled for stored grain while the second group is labeled for protecting the seed. Products labeled for stored seed are **Actellic**, **Reldan** and **Storcide**. These products specifically seek labeling against stored products insects such as bran bugs, weevils grain moths, etc. **Actellic**, **Reldan** and **Storcide** are approved for use on commodities that are destined for food and feed.

Formulations of **Cruiser**, **Gaicho**, and **Lorsban** are labeled for protecting the seed. Most often they provide protection of the seed as it germinates and in the small seedling stages, from insects in and on the soil (wireworm, aphids, seed beetles and maggots etc). They may also provide protection from stored grain insects, but are for use on seed to be planted, **not** for use in the commodities immediately destined for food and feed.

The seed storage manager must look closely at the intended use of that seed/grain and whether or not that use is likely to change. Also, the manager must decide whether or not the seed/grain must be able to germinate or will simply be in a bulk that needs to be protected from becoming “buggy”.

Regardless of the route chosen the pesticide label must be examined closely. Not all company claims are equal in either the list of pests for which protection is claimed, the ease of treatment and the level of protection.

The following tips can be of help in protecting seed:

- These recommendations assume that the seed is initially free from insect infestation. If the seed is infested it must be fumigated to control existing populations then treated with one of the seed protectants.
- Thoroughly clean the storage area. Use shovel, broom and vacuum cleaner. Remove **all** old grain, broken pieces and grain dust from the area.
- Treat the storage area. **Tempo SC Ultra** at a rate of 0.27 fl. to 0.54 fl. oz. (8 to 16 ml) per gal of water is a good choice for this. Apply as a general surface, spot, crack and crevice treatment. Tempo SC Ultra may **NOT** be applied to the grain. Other insecticides may be used. However, using a different insecticide for treating the premises than is being applied to the seed is a good idea.
- If the storage area can not be adequately cleaned it may have to be fumigated.
- Thoroughly clean the seed. Many of the most common insect pests can not live on whole, solid kernels. Most infestations are based on broken, or cracked kernels and dust.
- Consider applying a seed/grain protectant. If you do this follow the label closely!
- “Small” quantities of seed can be stored in a cooler. Temperatures below 50°F will prevent insect damage.

THE RISKS AND BENEFITS OF TANK MIXING HERBICIDES

James R. Martin
Extension Weed Scientist

Before wheat growers consider using any herbicide tank mixture for the first time, it is important to understand the potential risks and benefits associated with this practice.

Weed Control

Achieving broad spectrum weed control in a single-pass operation is an obvious advantage of tank mixing herbicides. Harmony Extra is widely used in Kentucky because it controls numerous weeds in wheat including wild garlic, common chickweed, and henbit, but it is not effective on cornflower. Including Buctril as a tank mix partner with Harmony Extra helps control many species including cornflower.

Another reason for tank mixing herbicides, especially products with different modes of action, is to limit the development of herbicide - resistance weeds. Herbicide resistance in wheat is not an issue in Kentucky as it is in certain other states. Nevertheless, using herbicides of different modes of action, either in tank mixtures or sequential sprays, may be a wise strategy where growers are spraying the same fields on an annual basis for managing cool-season species. This could be true whether you are making postemergence applications to wheat, or you are making fall or early spring burndown sprays for no-till soybeans or corn.

Reducing weed control as a result of tank mixing is a potential downside with this practice. According to UK research, Harmony Extra causes problems with ACCase inhibiting herbicides used in controlling Italian ryegrass in wheat. Results showed that combining Harmony Extra with Hoelon resulted in as much as 50% less ryegrass control compared with Hoelon alone. The loss in ryegrass control was as much as 70% when Harmony Extra was applied with Achieve.

Similar results have been observed with combinations involving Harmony GT, yet the loss in ryegrass control was not as much compared with those reported with Harmony Extra.

Antagonism to sulfonylurea herbicides can also occur when certain other herbicides are included as a tank mix partner. Wild garlic control with Harmony Extra or Harmony GT can be reduced when these herbicides are combined with Sencor. Control of certain broadleaf weeds may also be reduced when Harmony Extra or Harmony GT are mixed with Banvel or Clarity.

Achieving maximum weed control may require that herbicides be applied as a sequential spray. Special consideration may be needed where fields are infested with Italian ryegrass and cool-season broadleaf weeds.

A good illustration is where the Hoelon label recommends to not apply phenoxy based herbicides or Banvel within five days of Hoelon.

Crop Injury

Timing of application as well as adjuvants or certain emulsifiers can impact crop injury with certain tank mix combinations.

It is critical that the stage of growth of wheat is within the recommended range for all components in the spray mixture. A good example for this issue involves the use of Harmony Extra with 2,4-D. Harmony Extra can be applied after wheat is in the 2-leaf stage but before the flag leaf is visible; whereas, the timing for 2,4-D is usually limited to wheat that is fully tillered (usually 4 to 8 inches). Injury in the form of poor seed head development can occur if 2,4-D is included with Harmony Extra and applied to seedling wheat in the fall.

Including additives such as nonionic surfactants, or products formulated with emulsifiers, will enhance injury in certain tank mixtures.

Harmony Extra and Harmony GT usually require a nonionic surfactant as an additive; consequently special consideration is needed when they are combined with such products as Banvel, Clarity, or 2,4-D ester. The portion of the Harmony Extra label where these tank mixtures are discussed states "... *adding surfactant may increase the potential for crop injury*". Reducing the surfactant rate is usually recommended when such mixtures are used.

Although the combination of Harmony Extra and Buctril is a labeled mixture, growers should be aware that it has potential to injure wheat. UK research with this combination showed slight injury in the form of yellow and burned foliage. The injury was not present by the time wheat was mature.

The risk of injury with surfactants or certain herbicide formulations is especially a concern when liquid nitrogen fertilizer is used as a part of the carrier of the spray solution. The number of problems with this issue has declined in recent years since most liquid nitrogen is applied alone in sprayers equipped with stream bars instead of applying with herbicides using conventional spray tips.

The issue of crop injury with additives is not always as straight forward as we would like. As pointed out earlier, the Harmony Extra label discusses the risk of crop injury by using a surfactant when 2,4-D is used as a tank mix partner. Combining Harmony Extra with 2,4-D is sometimes recommended as a means of limiting crop injury. The Harmony Extra label states "*Under certain conditions such as heavy rainfall, prolonged cold weather, or wide fluctuations in day/night temperatures prior to*

or soon after Harmony Extra application, temporary discoloration and/or crop injury may occur. To reduce the potential of crop injury, tank mix Harmony Extra with 2,4-D (ester formulations perform best) and apply after the crop is in the tillering stage of growth”.

Key factors about tank mixing herbicides are addressed in the table on the following page. More specific comments can be found on the product labels. Pay particular attention to precautions that discuss issues involving environmental stress conditions. The sequence in which the herbicides and additives are mixed can also be important.

It is not feasible to address all possible combinations or circumstances on product labels. Before using mixtures that have not been proven or tested, it may be wise to consult with your local company representative.

**WHEAT TOLERANCE TO
FALL-APPLIED HERBICIDES**
James R. Martin- Extension Weed Scientist

The abundance of weedy vegetation caused by the unseasonably mild fall may tempt wheat growers to spray herbicides before we go into the winter. Those who are considering this practice should be aware that crop injury from spraying too early is a potential problem with 2,4-D and Sencor. There also has been a perception that dicamba (Banvel, Clarity, and Sterling) may also injure seedling wheat.

A review of the label and research may help growers understand the risks of spraying these herbicides to wheat during early growth stages.

2,4-D

Although product labels vary slightly in describing the specific growth stage of wheat, the general rule of thumb is to spray 2,4-D when wheat is fully tillered. Applying 2,4-D in the fall to seedling wheat or during jointing or boot stages can result in crop injury.

Information reported in Nebraska guide G88-863 indicated, wheat yield was reduced by more than 20% when 2,4-D amine was applied in the fall to wheat with 2 to 4 leaves. A 10% reduction occurred when 2,4-D was applied in the boot stage. Applying 2,4-D to fully tillered wheat did not result in a significant loss in grain yield.

Sencor

The two issues to consider when using Sencor in wheat are: 1) varietal tolerance to Sencor and 2) herbicide rate as a function of crop growth stage.

Some wheat varieties are more prone to injury from Sencor than other varieties. Developing new varieties is a continuous process which makes it difficult to keep abreast of the latest information on tolerance of varieties to Sencor.

Bayer recognized this issue and worked closely with Wheat Tech, near Russellville, KY, to do an in-depth screening of tolerance of varieties in our region to Sencor. The most recent information on this matter is in the Bayer fact sheet on the following page. The fact sheet classifies varieties as tolerant, moderately tolerant, or sensitive. Varieties in the moderately tolerant category are probably tolerant in most situations, but can be injured in such cases as adverse environmental conditions or excessive rate of herbicide.

The Sencor label provides specific recommendations based on herbicide rate and development of wheat (see table 1).

Table 1. Sencor Rate for Different Wheat Growth Stages

Sencor DF Rate	Wheat Growth Stage
1 to 3 oz/A	2 leaves to 2 tillers*
4 to 5 oz/A	3 to 4 tillers **
4 to 8 oz/A	>4 tillers **

* Use 1-3 oz/A when secondary roots are less than 1 inch long.

** Use 4-8 oz/A when secondary roots are at least 1 inch long. Do not apply before 75 days after planting but apply before jointing.

UK research in 1999 on Pioneer 2552 wheat (a variety considered moderately tolerant to Sencor) indicated that Sencor caused slight discoloration and stunting of wheat. As much as 20% injury occurred by applying Sencor at 8 oz/A to wheat in Feekes 1. However, very little injury was observed when the 8 oz/A rate of Sencor was applied to wheat in Feekes 5. Sencor injury did not reduce test weight or yield of wheat.

Dicamba

The risk of injuring young seedling wheat with dicamba is not well known compared with the risk of injury from applying it to wheat in the jointing stage of growth.

Most of the dicamba in our region is applied in the spring after winter dormancy but before jointing. This was the foundation on which Banvel was recommended when it was initially introduced for use in wheat. However, current labels of dicamba products allow for applications to be made before, during, or after planting wheat but prior to jointing.

Limited research by UK indicated that Clarity caused slight stunting of young wheat plants and was difficult to detect. Although some early season injury occurred with Clarity applied at Feekes 1 and Feekes 2, the level of injury did not exceed 13% and gradually decreased over time. No injury was observed when Clarity was applied at 4 oz/A to wheat in Feekes 5. The slight amount of injury that occurred with Clarity did not appear to affect test weight or yield of wheat.

Although seedling wheat appears to be tolerant to dicamba the general consensus is that the risk of injury is least when it is applied after winter dormancy but prior to jointing.

Regardless of which herbicide is applied to wheat, the environmental conditions before during and after application can have an affect on crop injury. Many herbicide labels caution against treating wheat that are stressed. This may be especially true when using high rates, or are near to growth stage limit specified on the label.

UPCOMING EVENTS

Winter Wheat Meeting

The Winter Wheat Meeting will be on January 6, 2004 at the Christian County Extension Office. One aspect of the meeting will be to educate producers on head scab and why vomitoxin levels are causing so many problems.

LOOK FOR A SPECIAL ISSUE OF HEAD SCAB NEWSLETTER— COMING SOON!

POSTMERGENCE HERBICIDE TANK MIXTURES LABELED FOR WHEAT

Herbicide Component #1 and Use of Adjuvants		Herbicide Component #2 ¹								
		Achieve	Banvel	Buctril	Clarity	2,4-D	Harmony Extra	Harmony GT	Hoelon	Sencor
Achieve SC ²	Supercharge at 4 pt/100 gal is required. Use AMS if spray water contains >400 bicarbonate ions. AMS may also enhance control when mixed with broadleaf weed herbicides.		-	L	-	-	-	-	-	-
Banvel 4S	Adjuvants normally not used; however, surfactant at 1-4 pt/100 gal may be included when mixed with sulfonyleurea herbicides.	-		L	-	L	L	-	-	L
Buctril 2EC	Adjuvants normally not used; however, surfactant at 1 qt/100 gal may be included when mixed with Harmony Extra.	-	L		-	L	L	-	L	L
Clarity 4S	Adjuvants normally not used; however, surfactant at 1-4 pt/100 gal may be included when mixed with sulfonyleurea herbicides.	-	-	L		L	L	-	-	L
Harmony Extra ³ or Harmony GT ³	Use surfactant at 1 to 2 qt/100 gal when applied alone. However, when mixed with such herbicides as dicamba (Banvel or Clarity), or 2,4-D use only 0.5 to 1 qt of surfactant /100 gal. When applying liquid N fertilizer as a part of the spray carrier at rates	-	L	L	L	L			-	-
Hoelon ⁴	Adjuvants normally not used. Do not use crop oil concentrate during cool & wet conditions. Wheat yellowing may occur if oil concentrate is used.	-	-	L	-	-	-	-		-
Sencor DF	Adjuvants normally not used; however, surfactant may be included when mixed with sulfonyleurea herbicides such as Harmony Extra. Do not use crop oil concentrate.	-	L	L	-	L	L	-	-	
2,4-D Ester	Do not mix with oils, surfactants, or other adjuvants unless specifically recommended.	Most 2,4-D products do not list tank mixes for wheat. However, 2,4-D may be referenced on other herbicide labels.								

¹ (= Labeled) (- = Not labeled or insufficient information for KY conditions)

² For herbicides not approved for tank mixing with Achieve, apply as a separate spray and allow at least a 5-day interval between Achieve followed by the other herbicide; and a 15-day interval between the other herbicide and Achieve.

³ Tank mixes of Harmony Extra or Harmony GT with Sencor may reduce wild garlic control. Also tank mixes of Harmony Extra or Harmony GT with dicamba may reduce control of some broadleaf weeds.

⁴ Do not apply phenoxy based herbicides or Banvel within five days of Hoelon, or grassy weed control will be reduced. Do Not use less than 2 pt of Hoelon/A when tank mixing with liquid nitrogen.

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