The Oklahoma Cooperative Extension Service
Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

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Effect of Planting Date and Seed Treatment on Diseases and Insect Pests of Wheat

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Typically about half of the winter wheat in Oklahoma is sown with the intent of being used as a dual-purpose crop. In this system, wheat is planted in early to mid-September to maximize forage production for grazing by cattle from November to late February, then also harvested for grain. In a grain-only system, wheat is generally planted in October, then harvested in early summer. Planting wheat early for use as a dual-purpose crop significantly increases the prevalence of several diseases caused by viruses, fungi, and by insect pests compared to planting wheat later for grain-only.

Virus diseases affecting early-planted wheat

Early planted wheat is prone to attack by at least four virus diseases including wheat streak mosaic virus (WSMV), high plains virus (HPV), Triticum mosaic virus (TrMV), and the aphid/barley yellow dwarf virus (BYDV) complex. The first three of these virus diseases are transmitted by the wheat curl mite (WCM) and cause similar symptoms in wheat. WCMs and these viruses survive in crops such as wheat and corn, as well as many grassy weeds and volunteer wheat. In the fall, WCMs spread to emerging seedling wheat, feed on that seedling wheat, and transmit the virus to the young wheat plants. Wheat infected with WSMV, HPV, or TrMV in the fall is either killed the next spring or will be severely damaged. Seed treatments to control these viruses or the WCMs that transmit them are not available. However, planting later in the fall (after October 1 in northern OK and after October 15 in southern OK) and controlling volunteer wheat are two practices that provide some control. It is critical to completely destroy volunteer wheat at least two weeks prior to emergence of seedling wheat because WCMs have a life span of seven to ten days. Thus, destroying volunteer wheat at least two weeks prior to emergence of seedling wheat reduces mite infestation in the fall. In addition to these cultural managements, two winter wheat varieties (RonL from Kansas and Mace from Nebraska) have resistance to WSMV; however, the resistance in RonL is not effective at temperatures above about 18 C (64 F), neither variety is resistant to HPV or TrMV, and neither variety is highly adapted to production in most of Oklahoma. Thus, planting either of these varieties is recommended in Oklahoma only if you are willing to sacrifice some yield potential in exchange for resistance to WSMV in wheat planted for grain production only. For more information on WSMV and HPV, go to the Plant Disease & Insect Diagnostic Laboratory web page at: http://www.ento.okstate.edu/ddd/hosts/wheat.htm.

The fourth virus listed above (BYDV) is a virus transmitted by many cereal-feeding aphids. In Oklahoma, bird cherry-oat aphid is the most common and prevalent aphid that spreads this virus. Fall infections by BYDV are the most severe because the virus has a longer time to damage the plant as compared to infections that occur in the spring. Several steps can be taken to help manage BYDV. **First,** a later planting date (after October 1 in northern Oklahoma and after October 15 in southern Oklahoma) helps reduce the opportunity for fall infections. **Second,** some wheat varieties (e.g., 2174, Billings, Duster, Endurance, Garrison, Ruby Lee, Gallagher, Iba, Armour, Everest, and JackPot) resist BYDV better than other varieties; however, be aware that no wheat variety has absolute resistance to the aphid/BYDV complex. **Third,** control the aphids that transmit BYDV. This can be done by applying contact insecticides to kill aphids, or by treating seed before planting with a systemic insecticide (Table 1). If using a contact insecticide, be sure to apply before aphids are present in large numbers to reduce the spread of BYDV as much as possible. Systemic seed-treatment insecticides including Gaucho (imidacloprid) and Cruiser (thiamethoxam) can control aphids during the fall after planting, but in some years, aphids are sparse in the fall and planting insecticide-treated seed in a year with no or sparse aphids in the fall would not be as beneficial as in years when aphids are numerous. Be sure to thoroughly read the label before applying any chemical. For more information on the aphid/BYDV complex, go to the web page for the Plant Disease and Insect Diagnostic Laboratory at: http://www.ento.okstate.edu/ddd/hosts/wheat.htm.

Hessian fly – an insect pest that can affect early planted wheat

Hessian fly infestations occur in the fall and spring. Fall infestations arise from over-summering pupae that emerge when climate conditions become favorable. Delayed planting

(after October 1 in northern Oklahoma, and after October 15 in southern Oklahoma) can help reduce the threat of Hessian fly, but a specific "fly free date" does not exist for most of Oklahoma as it does in Kansas and other northern wheat-growing states. This is because smaller, supplementary broods of adult flies emerge throughout the fall and winter. Some wheat varieties are either resistant (e.g. Duster, CJ, Gallagher, and Centerfield) or partially resistant (e.g. Ruby Lee, Hatcher, 2174, and Okfield) to Hessian fly infestations. Hessian fly infestations can be reduced somewhat by destroying volunteer wheat in and around the field at least two weeks prior to emergence of seedling wheat. Seed treatments that contain imidacloprid or thiamethoxam (Table 1) will also help reduce fly fall infestations, especially if combined with delayed planting and volunteer destruction. For more information, consult OSU Extension Facts EPP-7086, Hessian Fly Management in Oklahoma Winter Wheat

Root and foot rots that can affect early planted wheat

These include several diseases caused by fungi such as dryland (Fusarium) root rot, Rhizoctonia root rot (sharp eyespot), common root rot, take-all, and eyespot (strawbreaker). Managing root and foot rots is difficult. There are no resistant varieties, and although fungicide seed treatments with activity toward the root and foot rots are available, their activity usually involves early-season control or suppression rather than control at a consistently high level throughout the season. Often, there also are different "levels" of activity related to different treatment rates, so again, CAREFULLY read the label of any seed treatment to be sure activity against the diseases and/or insects of concern are indicated, and be certain that the seed treatment(s) is being used at the rate indicated on the label for activity against those diseases and/or insects.

Later planting (after October 1 in northern Oklahoma and after October 15 in southern Oklahoma) also can help reduce the incidence and severity of root rots, but planting later will not entirely eliminate the presence or effects of root rots. If you have a field with a history of severe root rot, consider planting that field as late as possible or plan to use it in a "graze-out" fashion if that is consistent with your overall plan.

For some root rots, there are specific factors that contribute to disease incidence and severity. For example, a high soil pH (>6.5) greatly favors disease development of the root rot called take-all. OSU soil test recommendations factor in this phenomenon by reducing lime recommendations when continuous wheat is the intended crop. Another practice that can help limit take-all and some of the other root rots is the elimination of residue. However, elimination of residue by tillage or burning does not seem to affect the incidence or severity of eyespot (strawbreaker). For more information on wheat root rots, take-all and eyespot (strawbreaker), see OSU Extension Facts F-7622 or go to the web page for the Plant Disease and Insect Diagnostic Laboratory at: http://www.ento.okstate.edu/ddd/hosts/wheat.htm.

Seed treatments can help manage many of the diseases/insect pests associated with early planting

There are several justifications for planting treated wheat seed that result in increased economic return. These include:

1. Control of common bunt (also called stinking smut) and loose smut. The similarity of these names can be confusing. Both affect the grain of wheat, but common bunt spores carryover on seed or in the soil, loose smut carries over in the seed. Seed treatments are highly effective in controlling both diseases. If common bunt was observed in a field and that field is to be planted again with wheat, then planting certified wheat seed treated with a fungicide effective against common bunt is strongly recommended. If either common bunt or loose smut was observed in a field, grain harvested from that field should not be used as seed the next year. However, if grain harvested from such a field is to be used as seed wheat, treatment of that seed at a high rate of a systemic or a systemic + contact seed treatment effective against common bunt and loose smut is strongly recommended. For more information on common bunt & loose smut, see: http://www.entoplp.okstate.edu/ddd/hosts/wheat.htm, consult the "OSU Extension Agents' Handbook of Insect, Plant Disease, and Weed Control (OCES publication E-832)," and/or contact your county Extension educator.
2. Enhance seedling emergence, stand establishment and forage production by suppressing root, crown and foot rots. This was discussed above under "Root and Foot Rots." Refer to Table 1 for a more detailed description.
3. Early season control of aphids and Hessian fly. This can be achieved by using a seed treatment containing an insecticide. Refer to Table 1 for a more detailed description of seed treatments with insecticidal activity.
4. Control of fall foliar diseases including leaf rust and powdery mildew. Seed treatments are effective in controlling foliar diseases (especially leaf rust and powdery mildew) in the fall, which may reduce the inoculum level of these diseases in the spring. However, this control should be viewed as an added benefit and not necessarily as a sole reason to use a seed treatment.

Often a combination of chemicals is present in seed treatments, which results in a broader spectrum of activity against both diseases and insects. Examples of this include CruiserMaxx, Gaucho XT, and Rancona Crest, which contain an insecticide and fungicides so control and/or suppression of aphids (and hence BYDV), Hessian fly, wireworms, smuts and bunts, and seedling root rots is available in one treatment (Table 1). Other seed treatments such as Raxil MD, Dividend Extreme, Charter PB, and Charter F[2] contain only fungicides, but can easily be mixed with an insecticide such as Gaucho 600 or Cruiser to obtain activity against bunts, smuts, seedling root rots and insects as well. The emphasis is that if a seed treatment is used, be sure to carefully read the label to ensure that the treatment is intended (and labeled) for your desired goal, and that it is applied at a rate labeled for the desired activity. For more information on seed treatments, their intended uses and rates consult the "OSU Extension Agents' Handbook of Insect, Plant Disease, and Weed Control (OCES publication E-832)," and/or contact your county Extension educator.

Table 1. Common Seed Treatments for Use against Wheat Diseases and Insect Pests.
This information is provided only as a guide. It is the responsibility of the pesticide applicator by law to read and follow all current label directions. No endorsement is intended for products listed, nor is criticism meant for products not listed. NOTE: Many seed treatments have a required post-planting interval before grazing is allowed; check the label!

Product & (company)	*Active ingredients*	*Rate (oz/cwt)*	*Activity against diseases/pests*[A]				
			Ins/BYDV	*Sm/Bu*	*RR*	*DO*	*FFol*
CruiserMaxx (Syngenta)	thiamethoxam difenoconazole mefenoxam	5.0	A[B]	A	A	A	A
Cruiser 5FS (Syngenta)	thiamethoxam	0.75-1.33	A	NA[B]	NA	NA	NA
Dividend Extreme (Syngenta)	difenoconazole mefenoxam	1.0-4.0[C]	NA	A	A	A	A
Gaucho 600 (Bayer CropScience)	imidacloprid	0.8-2.4	A	NA	NA	NA	NA
Gaucho XT (Bayer CropScience)	imidacloprid metalaxyl tebuconazole	3.4	A	A	A	A	A
Raxil MD (Bayer CropScience)	tebuconazole metalaxyl	5.0-6.5	NA	A	A	A	A
Rancona Crest (Chemtura)	imidacloprid ipconazole metaxyl	5.0-8.33	A	A	A	A	A
The following alone or in various combinations (all are BASF products):							
Charter	triticonazole	3.1	NA	A	A	NA	A
Charter PB	triticonazole + thiram	5.5	NA	A	A	A	A
Charter F[2]	triticonazole + metalaxyl	5.4	NA	A	A	A	A
Stamina F3 HL	pyraclostrobin + triticonazole + metalaxyl	1.0	NA	A	A	A	A
Axcess	imidacloprid	0.8-2.4	A	NA	NA	NA	NA
Acquire	metalaxyl	0.1-0.375	NA	NA	A	NA	
Stamina	pyraclostrobin	0.4-0.8	NA	NA	A[D]	NA	NA

[A] Ins/BYDV=insects (aphids, Hessian fly, wireworms)/barley yellow dwarf virus; Sm/Bu=smuts/bunts; RR=root rots; DO=damping-off; FFol=fall (early season) foliar diseases.
[B] A=active (indicates a range of control from partial to complete – check label for details); NA=not active.
[C] Activities listed are for the 4 oz rate.
[D] Activity against root rots caused by Rhizoctonia solani and Fusarium spp.