# Optimizing Sunflower Yield

## Special Supplement to *The Sunflower*

Featuring Tips from 'People in the Know'

# — Introduction —

During the 30-plus years the National Sunflower Association has been in existence, there have been several occasions when a producer mentioned dryly that, due to the conditions, he "had" to plant sunflower. Such an attitude doesn't bode well for achieving top yields. Yet when looking at the yield data, it's obvious the majority of you manage your crop to attain yields at the high end of the scale.

Sunflower yields have been improving through the years. Some of that is due to improved hybrids; some to improved inputs (such as new weed control options). But a majority of it is due to hard work on the part of you, the producer.

This insert's focus on reaching the top yield is obviously important for your bottom line. But it's also vital for the overall industry. The ability of sunflower products to be competitive in the food market is ultimately comes back to yield.

Research scientists know there is a great deal of room for improving yields. Research plots are one indication on a per-hybrid basis. But then there are the actual field data from commercial fields. It is not uncommon to hear yield reports of 3,000 lbs-plus on dryland fields. There even is the occasional report of 4,000 lbs/ac. So the potential definitely exists for bumping yields higher.

The annual NSA crop survey has continued to identify plant spacing — or lack of uniform plant stand — as the number-one reason for a surveyed field not attaining its yield potential. That, of course, is a head scratcher because there are so many variables that go into plant stand establishment. In conducting a few of the annual field surveys over the years, it was always a real pleasure to be in a field where the plants uniformly stand 10 inches apart and the head size is consistently seven inches in diameter. It is those fields that are consistently in that 3,000-lb category based on the calculated yield formula.

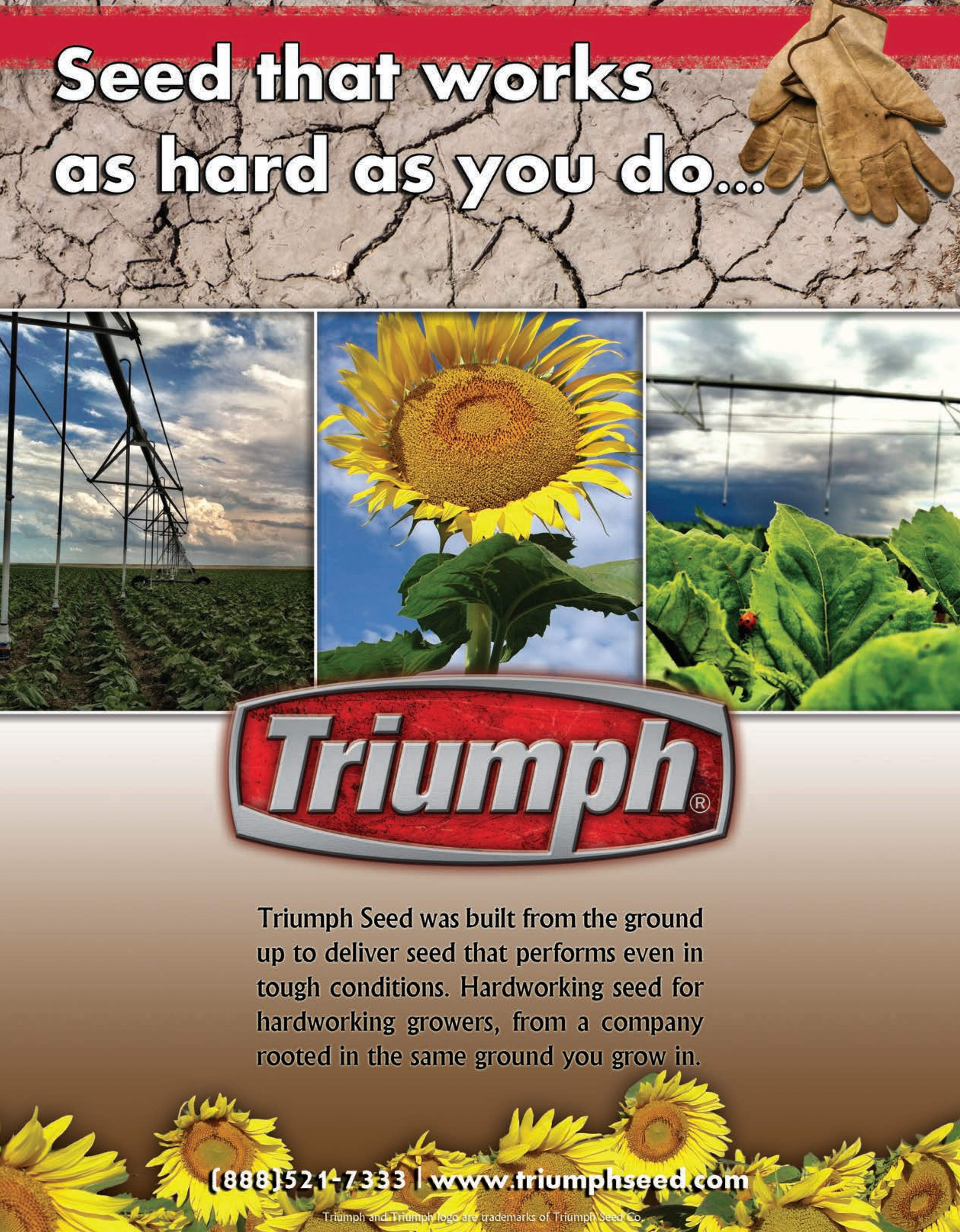
This crop has a reputation to the effect that "everything living likes a sunflower field." There is no question that sunflower has plenty of insect pests, some of which attack the seedling. But the new and improved seed treatments have gone a long way toward blunting those pests. Disease issues are always lurking. Downy mildew continues to be a real challenge despite better fungicide seed treatments and more-resistant genes. The list of pests goes on. But so do genetic improvements and registered crop protection products. More improvements are on the research assembly line.

Over the years, I have heard lots of producers' comments about this crop. At the end of the day, though, the most common producer testament has been that sunflower has consistently provided profitable returns, year in and year out. In some cases you went so far as to say that sunflower saved the farm when overall conditions were very bad.

We hope that you find a few meaningful tips and ideas in this insert to help increase your bottom line. That, in turn, is good for everyone else who is dependent upon this crop. We are always looking for your suggestions of what is working for you in your operation. The best to you in the 2012 season and beyond. **— Larry Kleingartner** ■

---

***Editor's Note:*** *Larry Kleingartner retired at the end of 2011 after serving as executive director of the National Sunflower Association for more than three decades.*


Seed that works
as hard as you do...
Triumph®
Triumph Seed was built from the ground up to deliver seed that performs even in tough conditions. Hardworking seed for hardworking growers, from a company rooted in the same ground you grow in.
(888)521-7333 | www.triumphseed.com
Triumph and Triumph logo are trademarks of Triumph Seed Co.

## — Tips For —

# Choosing Your Hybrids

**By John Swanson***

Photo: Don Lilleboe

**1. Which market is the best for your farm?** Whether confection, oil, birdseed or specialty oil, it is necessary to consider which market is the most likely or works best for your market or your growing region. High oleic now can be used for NuSun, but NuSun hybrids will not make high-oleic oil. Most confection companies have hybrids they prefer for their particular markets.

**2. Yield is next most important, but there are other factors to consider.** For oil-type hybrids, oil per acre is more important than just yield. This is the oil percentage times yield, and it is really the basis for payment. In these days of higher-priced sunflower, high-oil hybrids really do give you a very good advantage, as you can often get the total cost of seed back in your oil premium.

At 2,000 lbs/ac and 48% oil, with $28/cwt sunflower the oil premium is $89.60 per acre. This would cover all your seed and weed control costs. At 1,500 lbs, 45% oil and again a $28/cwt market price, the premium is $42 per acre — way more than most hybrids' seed cost. If you are growing hybrids with low oil percentage, it will cost you — unless you have a very large increase in yield.

**3. Look at yields from several trials from several locales when evaluating a hybrid's stability.** I can always find at least one trial where even a poor hybrid will do well. It is hard to make a good hybrid look bad if you look at numerous trials. Moisture and weather patterns differ each year, so looking at data from other areas helps gauge stability. I know sunflower breeders who, to be sure of a hybrid's stability, prefer to compare sunflower data from several different continents before releasing a hybrid. Sunflower is much more "movable" from one area to another compared to corn or soybeans.

It is also necessary to look at LSD (**l**east **s**ignificant **d**ifference) when reviewing trial data. Sometimes there is no significant yield difference in the whole trial — even if there are several hundred pounds differences in yield among hybrids — because the LSD number is greater than those yield differences.

**4. Risk Aversion —** Here, I consider factors like disease resistance, stalk quality, maturity, shatter tolerance, etc.

---

** John Swanson recently retired as sunflower product manager for Croplan Genetics. A 40-year veteran of the sunflower industry, he has been a sunflower producer near Mentor, Minn., for a similar length of time. He also serves on the National Sunflower Association Board of Directors.*

## Hybrid Selection: A Grower Perspective

By Kevin Capistran*

**1. Decide which characteristics are "must haves."** For example:

• Contract specifications or market choices dictate whether you need a confection type, hulling suitability, NuSun, high oleic, etc.

• Hybrid maturity must be appropriate for your farm.

• For me, herbicide tolerance and above-average head rot tolerance are "must haves." For others, it could be things like plant height, high oil content, or rust or downy mildew resistance.

These are "black and white" items. Depending on how many "must haves" are on your list, you may be left with a limited number of hybrids from which to choose.

**2. About 75% of my acres** will be planted to hybrids I'm familiar with and have had success with on my farm.

**3. Plant your own strip trials.** A few extra hours at planting and harvest can be well worth it.

**4. Seek yield data from multiple locations and years.** We've heard this a hundred times, but it is sound advice. You are looking for yield stability.

**5. Not all yield trials are pertinent to your situation.** Rely on the trials that best fit your situation. Look at trials with similar geography, tillage practices, irrigation scenarios. Make sure the trial wasn't influenced by extreme weather, disease or insects.

**6. Think "dollars per acre,"** not just "pounds per acre." Consider oil content or seed size premiums.

**7. Some characteristics could help lower production costs.** For example, an earlier hybrid can mean lower drying costs or less bird damage. Herbicide tolerance traits give a different cost of production.

**8. Try a little bit of something new each year**. ■

---

** Kevin Capistran, who farms at Crookston, Minn., is first vice president of the National Sunflower Association.*

The diseases you have had in the past should dictate which one are most important for your farm. If you do not have to give up yield or oil, the more tolerant the hybrid, the less chance you will have problems.

For downy mildew, hybrids with the PL15 gene have resistance to all races. Some with the older genes (PL6 and PL8) resistant only to the older strains of downy mildew.

Sclerotinia tolerance can be for either stalk or head. At present, there are no totally Sclerotinia-resistant hybrids on the market. Breeding for this disease is very complicated, as there are several genes and modifiers that control it. There are improvements coming, thanks in a large way to the USDA/NSA Sclerotinia screening project. You can now choose hybrids with more tolerance to both head and stalk rot forms of Sclerotinia.

Downy mildew resistance and rust resistance are available in many current hybrids. Phomopsis tolerance is also a good idea.

**5. "Maturity" is not rated consistently among companies.** It is usually possible to look at most companies' hybrids and see which are earlier or later. Several companies use days from emergence to physiological maturity, which is 35 % moisture. Maturities will vary, depending on where a hybrid is being grown and what the growing season weather is like.

**6. Confection hybrids have all the challenges of oils** — except that of oil percentage. In addition, confections need to have the color, size and shape desired by the processor, along with a hull-to-nutmeat ratio that translates into test weight.

**7. Herbicide Tolerance —** I really believe the better the weed control, the higher the yield potential. SU- and IMI-tolerant hybrids give the producer better options for controlling weeds. It is my belief that within a few years, most — if not all — sunflower hybrids will have one of these options or some other weed control option.

**8. The overall performance** of the hybrid will, in the long run, net you more money than choosing the lowest-cost seed option. ■

## — Tips For —

# Optimizing Weed Control

## In The Northern Plains

By Richard Zollinger*

Photo: Don Lilleboe

***Editor's Note:** A number of similarities exist in terms of weed species and management strategies between the two major U.S. sunflower production regions. Simultaneously, however, there are some important differences. For that reason, we are presenting two sets of weed control tips — this one geared toward Northern Plains growers and one for Southern (High) Plains producers. That article begins on page 9Y.*

**1. Use rotation crops to reduce weed pressure.** Herbicide choices for weed control in sunflower are less than for many other crops. To successfully manage weeds in sunflower, use the preceding crops to reduce the weed seed bank — especially for difficult-to-control weeds like Canada thistle, common ragweed, wild buckwheat, nightshade and biennial wormwood. Herbicides registered in corn, wheat and most other grass crops will control problem broadleaf weeds. Glyphosate-resistant crops grown prior to sunflower can also reduce weed infestations from the popular and effective herbicide, glyphosate.

Weed surveys conducted in North Dakota show that many common weeds that were a problem 35 years ago are still present today, even though many new and effective herbicide chemistries have been invented. The surveys show the same weeds are still here, but their populations have significantly been reduced. Crop rotation, along with herbicide rotation, may contribute to this seed bank reduction.

**2. Know your weed spectrum.** Correctly identifying weeds in your field is the first principle of weed management. If you do not know the weeds or mistake weed identity, the chosen herbicide will miss the mark. Herbicides are an expensive part of crop production, and choosing the right herbicide and the right herbicide rate is critical to controlling your particular weed spectrum.

There are several examples of weeds that growers might mistake for other weeds. Biennial wormwood is often confused with common ragweed, as is eastern black nightshade for redroot pigweed. Volunteer glyphosate-resistant canola appears in fields out of nowhere, and growers might assume it is wild mustard. Bromes species, like downy brome and Japanese brome, are increasing all over North Dakota due to a wet cycle we are currently in. Some may mistake bromes for foxtail or wild oat. Many believe annual bromes will emerge only in the fall because of their winter-annual life cycle, but observation has shown they can emerge in the spring as well.

Weeds resistant to different herbicides are continually appearing in fields. Waterhemp looks very much like redroot pigweed, but is much more difficult to control as it has become resistant to at least six different herbicide modes of action, including glyphosate. Your application of glyphosate may control most of the redroot pigweed but miss the waterhemp. Correctly identify your weeds and choose a weed management program that will control those weeds.

**3. Use foundation treatments.** It is likely that most sunflower production is in no-till or minimum-till conditions. Eliminating steel forces growers to rely more on chemical weed control.

Foundation weed control is comprised of burndown and pre-emergence residual herbicides. The burndown application will likely be glyphosate plus another herbicide approved for use prior to planting sunflower. The end-goal of a burndown treatment is a weed-free seedbed, and it may require higher rates, depending on the weeds present.

Residual pre-emergence herbicides can be applied after seeding but prior to sunflower emergence. Pre-emerge herbicides may not provide 100% weed control but will decrease a significant portion of the weed population. This will remove a lot of pressure from the postemergence herbicides to do all of the weed control work.

North Dakota pesticide use surveys show very low foundation herbicide use in glyphosate-resistant crops. The 2008 survey indicated that only 4% of the soybean and 8% of the corn acres received a pre-emergence herbicide treatment, while 37% of the dry bean and 66% of sunflower acres were treated with a pre-emergence herbicides. Spartan and Prowl are popular herbicides applied pre-emergence in

** Richard Zollinger is extension weed specialist with North Dakota State University, Fargo.*

sunflower. They control many "pivot" weeds in sunflower fields and provide season-long residual weed control.

No broadspectrum postemergence herbicides are registered in sunflower, but Express is registered in ExpressSun sunflower and Beyond in Clearfield sunflower. A foundation herbicide program can benefit all three of these production systems.

**4. Know your sunflower type.** Current seed technology may make it hard to remember where each crop was planted. Roundup Ready crops, Roundup Ready/STS soybean, Liberty Link crops, Clearfield crops and ExpressSun sunflower are some herbicide-resistant technologies available. Misapplication of the wrong herbicide on a herbicide-resistant crop will result in severe injury.

Clearfield sunflower and ExpressSun sunflower both allow ALS-inhibiting mode-of-action herbicides for weed control. Express is from the sulfonylurea (SU) chemistry and Beyond is an imidazolinone (IMI); but both are ALS-inhibiting mode-of-action products — which might make a grower think it doesn't matter which herbicide is used on which type of sunflower. But only Beyond can be used on Clearfield sunflower, and only Express can be used on ExpressSun sunflower. These technologies are herbicide-specific, and using any other ALS herbicide, whether SU, IMI, TPS or SACT herbicide chemistries, will result in severe sunflower injury and plant death.

**5. Spray small weeds.** Herbicides are more effective on small weeds. Growers routinely wait until most weeds have emerged before spraying their postemergence herbicides. By waiting, early emerging weeds can be quite large at the time of application and may not be controlled. Spraying when weeds are small will allow herbicides to give more-consistent weed control and control of "marginally" controlled weeds. A foundation herbicide program will support earlier applications to small weeds.

The type of weed resistance has changed from the resistance we saw back in the 1990s. Weeds that developed resistance to ALS-inhibiting herbicides in past decades exhibited an "on/off" response like a light switch. Either they were highly susceptible or highly resistant. Resistance to glyphosate is different. Small weeds are much more susceptible to herbicide phytotoxicity, and resistance increases as plants get bigger. Spraying when weeds are small will result in better overall weed control.

**6. Respect the one.** "Respect the one" has reference to how resistance biotypes show up in fields. It usually starts as one or just a few plants in a patch in a field. When a plant naturally mutates and produces seed giving rise to resistance to a certain herbicide, or if weed seed from a resistant plant is transported into that field, a few plants will escape the respective herbicide. Some growers may see the small patch and think it is a sprayer skip or nonperformance from the herbicide due to a variety of reasons. Growers may not suspect the small patch is the beginning of weed resistance in the field; and if the plants are allowed to develop seed, that small patch can quickly grow to encompass most of the field in the following years.

If the plants were physically removed from the field (by hand weeding or rogueing), in essence the resistant genes would be eradicated and the problem stopped dead in its tracks. Many "older and wiser" growers I talk to confirm that pulling errant weeds was a normal practice many years ago, but has gone into hibernation due to the many effective herbicides presently on the market giving near-complete weed control.

**7. Optimize herbicide activity with appropriate adjuvants.** Most post-emergence herbicides require one or more adjuvants to optimize herbicide effectiveness. Adjuvants are broadly classified as surfactants, oils and fertilizer. Herbicide labels may allow a broad array of adjuvants, but rarely specify one particular adjuvant type.

Adjuvants are not regulated, thereby allowing an overabundance of adjuvants — even within adjuvant classes. Some adjuvants work and some don't. Unbiased third-party adjuvant testing is rarely done, making it harder for growers to choose effective adjuvants. NDSU is one of the few universities that has an adjuvant and formulation testing program. Much of the information is printed in the annual *North Dakota Weed Control Guide.*

In general, methylated seed oil (MSO) adjuvants are more effective than crop oil concentrate (COC or petroleum oil) adjuvants, while COC are more effective than nonionic surfactants (NIS). Label direction must be followed with addition of adjuvants, as some may be too aggressive and compromise crop safety. Always add a fertilizer source — either 28% urea ammonium nitrate (UAN) or ammonium sulfate (AMS) — if the label allows. The ammonium increases penetration, absorption and translocation of most all systemic herbicides on the market.

**8. Use adjuvants at the right rates.** Many oil adjuvants are recommended on a % volume basis (*e.g.*, 1% v/v). Growers who use a high spray volume of 15 to 25 gpa will have sufficient oil adjuvant to enhance herbicide activity. However, most growers in the U.S. use a lower spray volume because glyphosate is the principle herbicide used and glyphosate is more active in low spray volumes. Weed control will be reduced when growers apply low spray volumes of 5 to 10 gpa and use oil adjuvants on a % volume basis reduced because there will not be sufficient concentration of the adjuvant in the spray tank for the area covered.

Research at NDSU has shown that oil adjuvant applied on an area basis (*e.g.*, pt/A) will significantly increase herbicide activity — regardless of spray volume used — and will result in better weed control. The general rule of thumb for oil adjuvants is to apply at 1% v/v (label directions from most postemergence herbicides) but not less than 1.25 pt/A. ■

## — Tips For —

# Optimizing Weed Control

## In The Southern Plains

**By Phil Stahlman***

**1. Prevent weed seed production in the preceding crop and fallow period.** Individual plants of most weed species can produce hundreds to thousands of seeds. Preventing weed seed production in the preceding crop and/or fallow period prior to planting sunflower reduces the number of weeds to be controlled in the sunflower crop. The higher the weed density, the greater the possibility some weeds may escape control to compete with the crop and/or interfere with harvesting.

There are few options to control escapes or late-emerging weeds in sunflower. No herbicide is registered for use over-the-top (postemergence) to control emerged broadleaves in conventional sunflower; only in herbicide-resistant hybrids is this possible. Then, only Beyond® can be applied in Clearfield™ hybrids and only Express® in ExpressSun™ hybrids. *(See Tip #5 for additional information on Clearfield and ExpressSun sunflower technologies.)*

**2. Knowledge of history is the key to success.** Knowledge of field history, including weed presence, crop rotation and herbicide use, will help anticipate which weed species are most likely to occur — a necessity in selecting an appropriate herbicide program. Some herbicides, such as Prowl® H2O and generic products containing pendimethalin or trifluralin, control grass weeds more effectively than broadleaf weeds; while Spartan® controls several common broadleaf weeds but very few grass weeds. Dual Magnum® controls several annual grasses and some small-seeded broadleaf weeds. In most instances, however, mixtures of complimentary herbicides, such as Spartan plus Prowl H2O or Dual Magnum, are needed for satisfactory broadspectrum weed control.

If the previous crop was grain or forage sorghum or Roundup Ready® corn, soybean or possibly cotton, then volunteer plants of the previous crop will be hard-to-control weeds in sunflower. Whereas glyphosate can be used to control volunteer grain or forage sorghum plants prior to planting sunflower, glyphosate will not control volunteer plants of Roundup Ready crops. Grass herbicides such as Select®, Select® Max, Assure II®, Poast® or various generic products containing clethodim or quizalofop will control volunteer corn and grain sorghum plants — but not volunteer plants of cotton or soybeans. These herbicides will also control many late-emerging annual grasses. In-crop control of emerged susceptible weeds can be achieved by applying glyphosate using specialized spray hoods between rows; but there is risk of crop injury, and few growers are set up to make this type of application.

**3. Start clean and stand tall and evenly spaced.** Whether using conventional tillage, reduced or minimum tillage, or a no-tillage production system, it is essential to plant sunflower into a weed-free seedbed for maximum production potential. Early spring weed growth in a no-tillage system often requires at least two burndown applications ahead of sunflower planting. Because of low crop population and wide row spacing, sunflower is most vulnerable to weed interference early in the growing season before plants are large enough for leaves to shade weeds growing between plants within rows and between crop rows. Lack of uniformity in plant spacing and skips within planted rows allow sunlight penetration through the canopy to the benefit of weeds and detriment of the sunflower. Weeds flourish in skips, and species such as cocklebur and devil's claw can interfere with harvesting.

**4. Know the critical periods of weed interference.** There are two critical periods of weed interference, and both are influenced by weed density and environmental conditions. The first critical period is the length of time weed control must be maintained to prevent yield loss. The second critical period is the length of time weeds emerging simultaneously with the crop can compete before reducing crop yield.

Numerous studies have shown that two to four weeks of weed control in sunflower is needed to prevent yield loss. At Hays, Kan., longspine sandbur plants emerging two weeks later than sunflower developed about 80% fewer tillers and 50 to 80% fewer burs, compared to plants emerging simultaneously with sunflower. Sandbur plants emerging four weeks later than sunflower developed few tillers and produced fewer than six burs per plant.

Recent studies in Nebraska and Europe showed the length of time weeds can remain in the crop grown without use of a preemergence herbicide also was two to four weeks after emergence. By then, sunflower has three to four leaves. Use of a pre-emergence herbicide extended the allowable time of weed presence without reducing yield by about two weeks.

**5. Not all sunflower types are the same.** Most herbicides registered for use in sunflower can be used on both confection and oilseed types. Herbicide-resistant sunflower hybrids possess a trait that confers resistance to specific herbicides. Currently, there are only two such sunflower technologies: Clearfield sunflower with resistance to Beyond herbicide and ExpressSun sunflower with resistance to Express herbicide. Though both Beyond and Express have the same acetolactate synthase (ALS)-inhibiting mode of action, misapplying Express on Clearfield sunflower or Beyond on ExpressSun sunflower — or applying any ALS-inhibiting herbicides to any sunflower hybrid — will result in severe injury or plant death.

Sunflower hybrids of either of these herbicide-resistant technologies currently are not as common in the central/southern Great Plains as are traditional sunflower hybrids. Growers planting either of the herbicide-resistant sunflower types must be vigilant against misapplication of Beyond or Express to traditional sunflower — and must take precaution to avoid spray tank contamination when spraying traditional sunflower following herbicide application to herbicide-resistant sunflower.

**6. Use the right rate at the right**

---

** Phil Stahlman is research weed scientist with Kansas State University, Hays.*

**time.** Length of residual weed control from soil-applied herbicides is affected by many factors. The temptation is to use the lowest possible rate to minimize cost without considering soil type differences within fields, time of application or variable environmental conditions.

Though low rates of most herbicides can be quite effective under favorable conditions, consistency of performance and length of residual weed control frequently are improved by using higher recommended rates for specific soil type and organic matter content.

Herbicides applied a few days up to three weeks preplant generally will not provide effective weed control as long into the growing season as will applications made after planting (assuming adequate moisture for activation both times). So higher rates usually are recommended for early preplant applications compared to pre-emergence applications. The probability of timely activating rainfall is increased with early preplant application, which may omit the need for and offset the cost of an added burndown treatment at planting.

**7. Tip 6, Second Verse: Kochia and Palmer amaranth control.** Kochia has long been a common weed in sunflower, and populations of Palmer amaranth are on the increase. Kochia mostly germinates from March through mid-June when conditions are favorable, whereas Palmer amaranth can emerge as late as August and still produce seed. Lower rates of many soil-active herbicides have dissipated by then.

Spartan effectively controls several common broadleaf species, including Russian thistle, Palmer amaranth and kochia (including ALS- and glyphosate-resistant biotypes); but higher rates are needed on fine-textured soil with high organic matter content. At Hays, Kan., Spartan has generally provided better broadleaf weed control than either Prowl H20 or Dual Magnum. Preplant Spartan treatments 14 days or more before planting generally have provided better weed control (especially kochia) and crop tolerance than pre-emergence applications at planting. Spartan Charge® (sulfentrazone plus carfentrazone) and Spartan Advance® (sulfentrazone plus glyphosate) have enhanced burndown characteristics compared to Spartan. However, Spartan Charge will not control emerged grass weeds, so glyphosate should be added if grasses are present.

Dual Magnum is effective on Palmer amaranth, but once again higher rates are needed for season-long control. Tank mixtures of Spartan and Dual Magnum provide more-complete weed control than what is provided by either herbicide alone.

**8. Use appropriate adjuvants at the right rates.** Labels of most postemergence herbicides specify the use of one or more adjuvants to aid performance. The primary function of non-ionic surfactants is to increase spray coverage on plant surfaces, while crop oil concentrates, methylated seed oils and nitrogen fertilizer solutions (to a lesser extent) primarily facilitate penetration and uptake of herbicides through leaf surfaces.

Surfactant use rates typically range from 0.25 to 0.5% volume to volume (1-2 qt/100 gal), while the recommended use rate for crop oil concentrates and methylated seed oils is 1% volume to volume (4 qt/100 gal) or not less than 1.25 pt/A when spray volume is less than 10 gallons per acre.

Another category of adjuvants includes water conditioners and pH modifiers. Ammonium sulfate (AMS) is both a nitrogen source and a conditioner of hard water due to high cation concentration. The addition of AMS to spray solutions containing glyphosate is recommended at rates of 8.5 to 17 lbs dry ammonium sulfate per 100 gal of spray solution (or 2.5 to 5 gal of liquid AMS per 100 gal). AMS in solution dissociates and the sulfate binds with cations in the spray solution, thus preventing the development of herbicide (especially glyphosate)-cation complexes that tend to have lower absorption into plant leaves.

Most herbicide solutions have slightly acidic to neutral pH. Adjuvants marketed as pH modifiers lower the spray solution to pH 3.0 or less, so that the herbicide molecules are less prone to binding with positively charged salts that inhibit herbicide activity. Research on such products' effectiveness has resulted in mixed findings. ■

# More Reasons to Grow Mycogen® Brand Sunflowers

Mycogen Seeds has a history of delivering industry-leading sunflowers. But what does this mean to you? It means the opportunity for more pounds per acre, higher oil content and more marketing opportunities in multiple market segments. And Mycogen Seeds has the proof to back it up. What will be your reason to grow Mycogen® brand sunflowers?

### Reason 1: Proven to yield

In more than 2,250 head-to-head yield trials conducted over three years, Mycogen brand hybrids yielded 211 pounds more per acre on average in northern growing regions compared with hybrids from other seed brands, including Croplan, Syngenta (DeKalb), Pioneer and Seeds 2000. In southern growing regions, Mycogen brand hybrids outyielded the competition by an average of 90 pounds per acre.

### Reason 2: Higher oil content

In those same field trials, Mycogen brand sunflowers averaged 2.6 percent higher oil content versus the competition (45.5 percent compared with 42.9 percent) in northern growing regions and 2 percent higher oil content in southern growing regions (45 percent compared with 43 percent).

Growers such as Stetson Shreve from Big Springs, Neb., know what more oil does for their bottom line. "My family plants Mycogen brand sunflowers because of their proven results compared with varieties from other companies," Sheve says. He recently produced dryland sunflowers yielding more than 45 percent oil content.

**"My family plants Mycogen brand sunflowers because of their proven results compared with varieties from other companies."**
*— Stetson Shreve, Big Springs, Neb.*

### Reason 3: Market versatility

The Mycogen Seeds sunflower portfolio offers more than 20 hybrids for profit opportunities in more market segments. Many hybrids are multiuse, too, so growers have marketing options even after planting.

### Reason 4: Demanded by processors

Processors often ask for Mycogen® brand sunflowers by name, especially in the high-oleic and dehulling markets. Hybrids such as **8H288CLDM** and **8H449CLDM** not only offer genetic resistance to downy mildew and CLEARFIELD® herbicide tolerance, but they also provide the high-yield, high-oil and high-oleic acid levels desired by processors. **8D310** and **8D481** stand out with processors in the dehulling market.

### Reason 5: Grower success

"Mycogen brand sunflowers are at the top of the oil market," Shreve says. "They always have a good test weight and are high in pounds per acre. I strongly recommend them to anybody." High yield, more oil, market versatility and a product processors demand are why Mycogen brand sunflowers lead the industry and can work for growers like you.

Dow AgroSciences
Mycogen® SEEDS

**Science. Yield. Success.™** Dow AgroSciences

## — Tips For —

# Improved Sunflower Irrigation Management

**By Freddie Lamm, Danny Rogers, Joel Schneekloth & Rob Aiken***


Photo: Don Lilleboe

Irrigation management of sunflower starts with the same premise as any other crop — namely, to mitigate the effects of yield-limiting water stress with the ultimate goal of increasing net farm income. To accomplish this goal, producers must carefully manage many factors. Some of these factors are related and some interact with each other in different manners, requiring delicately balanced irrigation management decisions. As the new cropping season approaches, here are some tips for improved irrigation management.

---

**1. Management with Respect to Previous Crop —** Although it may seem odd to begin a discussion of irrigation management of sunflower by considering the previous crop, this is an important topic when the ultimate goal is to maximize net farm income. Previous crops leave behind residual soil assets, such as soil water and nutrients, which can be used to offset input costs in the coming year, thus requiring the producer to consider net farm income in a multi-year horizon.

For example, irrigated corn requires ample supplies of water and nutrients late in the cropping season to ensure optimum yields. So producers often choose sunflower as a rotational crop after corn in order to utilize the residual soil water and nutrients.

In addition to the economic benefit, producers obtain environmental benefits from reduced usage of scarce water resources and reduced potential of nutrient leaching. Producers should evaluate the available soil water in the profile prior to planting so that they can wisely manage their irrigation inputs.

**2. Management with Respect to Post-Sunflower Cropping —** The crop following sunflower should also be considered in irrigation management in a multi-year cropping system. Sunflower is a deep tap-rooted crop that can deplete the soil water profile to a greater extent and depth than most crops. The soil water profile may not be recharged to a great extent over winter because of the relatively low winter precipitation in the semi-arid Great Plains. Sunflower production has been found to reduce the yield of subsequent crops when soil water reserves are deficit; but it may actually increase the yield of the subsequent crop when soil water is adequate.

Sunflower seed and oil yield sensitivity to water stress is greatest during the period immediately prior to flowering through seed formation (R3 to R7). Concentrating irrigation applications during this period not only benefits the sunflower, but also partially replenishes depleted soil water reserves that may be needed by the following crop.

However, any concentration of irrigation to a specific growth period requires adequate irrigation capacity [*i.e.*, flow rate/area (*e.g.*, gpm/acre, inches/day)] and a reliable irrigation system that is not subject to frequent breakdowns.

**3. Management with Respect to Split-Cropping Scenarios —** Sunflower is often grown in split-cropping scenarios with a second crop, such as corn, under center pivot irrigation systems. This allows better management when the system has an insufficient irrigation capacity or when restrictions are placed on total irrigation amount. Although sunflower and corn have very similar peak crop water use (evapotranspiration or ET) rates, sunflower has a shorter growing season and a total seasonal crop water use that is approximately 20% less than corn.

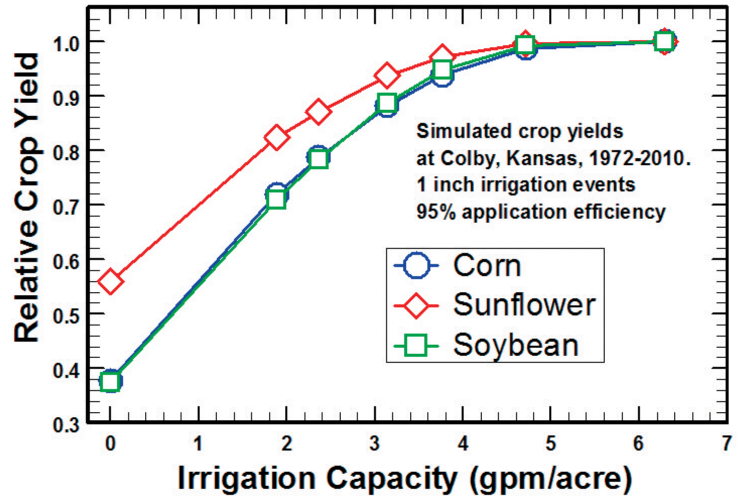
Additionally, the sunflower peak ET rate period is approximately 15% shorter in duration and is typically shifted later in the growing season, away from the critical silking period in corn. Irrigation needs are greatest for sunflower in August (when planted in early to mid-June), while corn requires more irrigation in July. Producers with lower-capacity irrigation systems or a limited seasonal water supply may plant an earlier-maturing corn hybrid and attempt to fully irrigate the corn through the critical reproductive period — and then concentrate irrigation on the sunflower later in the season.

**4. Management with Respect to Agronomic Practices —** Because the overall goal is to increase net farm income, the optimization of agronomic practices for higher-input production

---


** Freddie Lamm is irrigation engineer with Kansas State University at Colby; Danny Rogers is extension agricultural engineer with KSU, Manhattan; Joel Schneekloth is water resource specialist for Colorado State University, based at Akron; and Rob Aiken is crop research scientist with KSU, Colby.*

Figure 1. Relative crop yield (ration of predicted to maximum) as related to irrigation system capacity using 39 years of actual weather data in a modeling simulation at Colby, Kan.




systems (*i.e.*, pumping costs and irrigation system depreciation costs) is necessary.

For example, greater yields that are expected under irrigation can be limited by disease, weeds and insects. Producers might be tempted to accept a few percentage points yield reduction under nonirrigated cropping; but this might be a costly mistake for irrigated cropping. Also, producers should select optimal planting dates and seeding rates (plant population) for high production and oil content in their region.

Nitrogen fertilization should be closely matched with irrigated yield goals because excess nitrogen can reduce both seed yield and oil content. Sunflower typically requires 65 lbs of nitrogen (N) for each 1,000 lbs of seed yield; but this requirement should account for all sources of N (*e.g.*, previous cropping, manure, residual soil levels, mineralization, nitrate N in irrigation water, etc.).

Germination and obtaining sufficient and uniform stands can be a problem with sunflower production, so good seeding equipment and seeding practices should be used. Producers should be prepared to provide light irrigation applications to enhance germination and crop establishment if needed and should regularly evaluate the germination status. Heavy irrigation applications at planting should be avoided to prevent crusting and excessive cooling of the soil, but light applications may still be beneficial if heavy rainfall has caused crusting.

**5. Management with Respect to Irrigation Capacity —** Sunflower is thought to be better able to withstand short periods of crop water stress than are corn or soybean — and the duration of peak water needs is shorter. So sunflower can be a good choice for marginal-capacity irrigation systems. Because relative yield reductions are less for sunflower than corn and soybean *(Figure 1)*, many producers choose to deficit irrigate sunflower, resulting in an annual irrigation amount that is often four to five inches less than with fully irrigated corn or soybean.

Since the ultimate severity of drought conditions cannot be known prior to the growing season, producers may want to plant a portion of their production area to sunflower in order to reduce their overall crop production risk. Decision support software programs are available to evaluate cropping options and land/water allocations (*e.g.*, Crop Water Allocator at http://www.mobileirrigationlab.com).


**6. Management with Respect to Weather Conditions —** Irrigation scheduling is typically defined as "determining when to irrigate and how much to apply." Looking to the future, a more conservation-oriented and economically profitable definition can be stated as "delaying any unnecessary irrigation with the hope that the cropping season ends before the next irrigation is needed."

The crucial meaning of these two alternatives is not fundamentally different, but the complexity of "perfect" irrigation scheduling is best illustrated by the second definition. Fortunately, producers can easily make great strides at improving irrigation management while on the difficult journey toward that "perfect" management.

The easiest way to accomplish this task is through day-to-day irrigation scheduling for the entire season. In the Great Plains, weather-based irrigation scheduling water budgets have been shown to be a highly effective and easy-to-implement scheduling method. These water budgets (also known as checkbook irrigation scheduling) are based upon calculations or measurements of crop water use (ET), a withdrawal and deposits of precipitation and irrigation. When the budget (checkbook) reaches a predetermined level, irrigation is applied.

Many states in the Great Plains have automated weather stations that provide the necessary weather information required in water budget irrigation scheduling, and some states also have software for easy management of the irrigation scheduling process (*e.g.*, KanSched2 from K-State Research and Extension, available at http://www.mobileirrigationlab.com).

In addition, total season, day-to-day irrigation scheduling aids the producer's decision process in the majority of previously mentioned topic areas and helps in determining initiation and termination of the irrigation season.

**7. In Conclusion —** Irrigated sunflower production need not be a daunting task. The goal of increasing net farm income is the same for all crops. Some of the topics above overlap, but careful attention to these tips should help producers improve their overall irrigation management of sunflower.

For additional information, see the *High Plains Sunflower Production Handbook*, which is available online at http://www.ksre.ksu.edu/library/crpsl2/MF2384.pdf. ■

## — Tips For —

# Management of Diseases in Sunflower

By Sam Markell & Robert Harveson*

Sclerotinia-susceptible (center) and -tolerant (left & right) hybrids

Photo: Tom Gulya

Diseases are a fact of life with virtually any crop, including sunflower. It has been estimated that for every one crop grown, you have 100 different diseases. Fortunately, only a handful are present at any given time or are challenging enough to the crop that we need to actively manage them.

However, disease management is a moving target, and the most destructive diseases one year may not be the same diseases the following year. For example, different diseases cause problems in wet cycles than in dry cycles. (How much Sclerotinia head rot occurs in drought years?) . . . Pathogen race changes occur (think rust or downy mildew). . . . And a myriad of other factors, ranging from plant stress to host resistance, influences the diseases we have to manage.

Effective disease management can make a big difference in final sunflower yield and quality. Below are some key "general" points that will help you manage disease in sunflower, and in most of the other crops on your farm.

---

**1. Integrated Pest Management (IPM) —** Pathologists drop this acronym frequently, but for good reason. The simple concept is that you want to use multiple strategies to manage disease, not just one. Although pathologists tend to talk about miscellaneous (and sometime nebulous) potential negative consequences when growers rely on one management technique (how often have you heard us say "fungicide resistance development" or "race change"), the concept for a single grower is much simpler. IPM reduces your chances of a management failure occurring. If the resistance doesn't work, you might be covered because you rotated well, are prepared to put down a fungicide, etc.

**2. Know the Enemy —** There is an increasing amount of information available to help in disease identification and management. The National Sunflower Association does an excellent job of providing good pictures and key points about diseases that you are likely to see. Pathologists realize that differentiating diseases can be difficult, and as a result, questions and/or submissions to county agents, research extension centers and diagnostic labs are encouraged.

Similarly, the NSA and the universities will try to get critical information out as diseases are occurring. Whether through the NSA website, the *NDSU Crop & Pest Report* or radio spots, it is important to stay informed.

**3. Find the Enemy —** Scouting is one of the most important parts of disease management. If you are uncertain what disease(s) you have, it is very difficult to make informed decisions about specific management tools.

For example, if you find out your 'flowers have downy mildew, then the next time you can go back in that field you might want to plant a downy mildew-resistant (DMR) hybrid or use a different seed treatment.

Similarly, foliar fungicides are most effective at the early stages of an epidemic. If you get behind on rust, for example, you can be "toast." Furthermore, foliar fungicide applications would not be effective in managing downy mildew; thus, correctly diagnosing the problem is critical .

**4. Rotation —** Sunflower growers typically are very good at rotations. Four-year rotations are generally recommended. Almost all pathogens will be hurt by this length of rotation. They don't disappear, but there's a reason why growers don't plant 'flowers on 'flowers. Also, be aware of Sclerotinia-susceptible crops in the rotation. Dry beans, canola and potatoes are all quite susceptible to Sclerotinia and are not the best choices for inclusion in sunflower rotations.

**5. Resistance —** For a variety of reasons, selection of a hybrid is perhaps the most important decision you make. Although pathogen changes are frequent with several diseases, there are some growers who get hit often with the same disease. Maybe it's micro-climate, maybe it's bad luck; but, if you anticipate getting rust, plant a resistant hybrid. If you had lots of downy mildew in the field you are going back into you, try to get a DMR hybrid.

Be aware that resistance does not guarantee control. None of the resist-

* *Sam Markell is extension plant pathologist with North Dakota State University. Robert Harveson is plant pathologist with the University of Nebraska, Scottsbluff.*

ant varieties confer "immunity." As an example, a new race of the downy mildew pathogen was identified, which calls into question the DMR status of hybrids if you have the new race.

**6. Fungicide Seed Treatments —** Most, if not all, sunflower seed comes treated. There is good reason for this. Downy mildew is the most important pathogen that you try to manage with seed treatments, but other root rot pathogens lurk. There is a limited amount of information concerning the pathogen spectrum found underground on sunflower; but in most crops, seed treatments will help protect the germinating seed during the most important part of the plant's development. Establishment of a healthy stand is critical for a healthy crop.

**7. Foliar Fungicides —** On most crops, multiple diseases can be managed with foliar fungicides. On sunflower, the most important disease to manage is rust. Recent research has shown that rust pressure can reduce yield and test weight dramatically. In general, the time to pull the trigger is when rust severity on the upper leaves approaches 1%. However, this tended to correlate pretty well with the R5 growth stage (bloom), and an R5 application when you have rust often resulted in less yield loss and better disease control. The exception occurs if you see lots of rust in the vegetative stages, which likely mandates multiple (and early) applications.

Research on the management of other diseases with fungicides, most notably Sclerotinia head rot and Phomopsis stem canker, is under way. In both cases, disease reduction with fungicides has been observed in preliminary data. Due to the lack of information (and availability of fungicides), we are not yet ready to make concrete recommendations. That being said, the situation changes fast, so stay tuned.

The familiar uredial stage of rust / Photo: Robert Harveson

**8. Stay Engaged and Adapt —** The world changes quickly in agriculture. In the future, we would anticipate diseases and disease management will be different. We may have new diseases (or races) to worry about, new resistance in hybrids to combat them, and new fungicides and new recommendations to go with them. The more knowledge you have about disease management, the more likely you are to be able to manage diseases in a changing world. ■

## — Tips For —

# Optimum Insect Control

**By Janet Knodel***

Pheromone Trap / Credit: Janet Knodel, NDSU Entomology

Sunflower producers can minimize insect pest damage by adopting Integrated Pest Management (IPM) strategies — including monitoring for pests, using economic thresholds and combining various pest management strategies when available.

**1. General Knowledge on Insect Identification —** General knowledge about how to identify insect pests and also beneficial insects is an important first step for effective IPM. Pests need to be identified accurately because economic thresholds and control measures vary for different species. Many insects are beneficial, which may help reduce numbers of injurious insects. Recognizing which species are pests and which are beneficial is important.

Extension specialists and crop consultants should be able to help producers identify pests and beneficial insects and provide information about insect pest management. There are online guides to help, such as *Sunflower Production* A-1331 and Integrated Pest Management of Sunflower Insect Pests in the Northern Great Plains E-1457, both from the NDSU Extension Service.

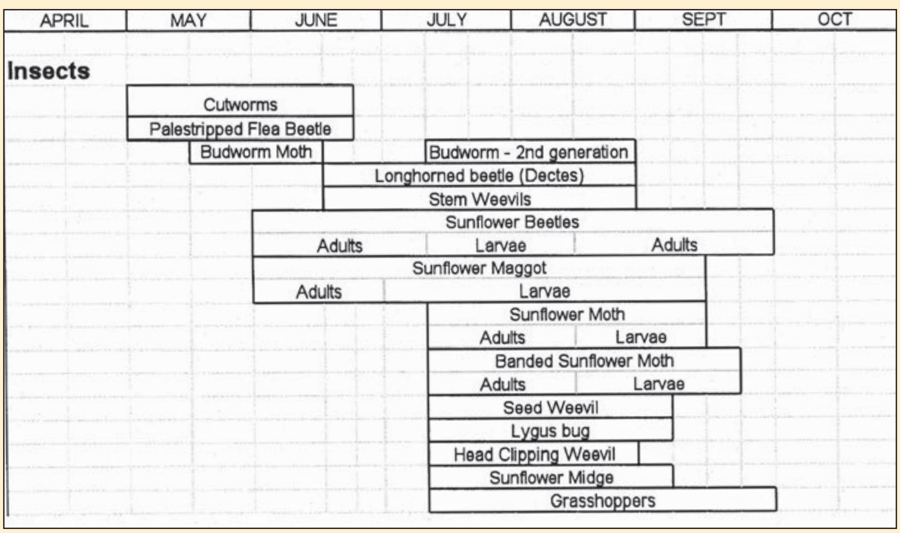
**2. Monitoring Pest Population Levels —** Sunflower fields should be evaluated regularly to determine pest population levels. A weekly field check is usually sufficient, but field checks should be increased to two or three times a week if the number of pests is increasing rapidly or if the number is approaching an economic threshold.

Sunflower pests are not distributed evenly throughout a field, and fields should be checked in several locations. Some insect pests, such as banded sunflower moth, are concentrated in areas of a field or are more abundant near the edges of a field than in the middle.

Determining the extent of a pest population on the basis of what is found in only one or two small areas of a field is not recommended. At least five sites per 40-acre field should be monitored to collect accurate information on the population density and extent of the pest infestation. Sampling sites should be at least 75 feet in from the field margin to determine whether an entire field or only a portion of the field requires treatment. When infestations occur primarily along field margins, treating only the margins of the field can reduce unnecessary expensive inputs and still provide economic control. In most cases, 20 plants per sampling site should be examined, sampling in a Z or X pattern through the field.

Pheromone traps are commercially available for monitoring banded sunflower moth and sunflower moth. A sex pheromone (chemical) attracts the male moth into the trap. There are various types of traps for monitoring adult moths. Pheromone trapping of moths should primarily be used to determine whether moths are emerging or present in the area, and to determine their local populations. For banded sunflower moth, research shows that using trap catches is not a reliable way to determine treatment thresholds. However, for sunflower moth, insecticide applications should be considered when pheromone traps catch an average four moths per trap per day from the R3 through R5 growth stages.

**Growing Season Calendar Indicating Time of Occurrence of Major Insect Pests in the Northern Great Plains Region**




** Janet Knodel is extension entomologist with North Dakota State University, Fargo.*

Banded Sunflower Moth Adult / NDSU Entomology

| Insect Pest | 'Best' Planting Dates to Reduce Damage (Northern Plains Region)<br>*Early = early to mid-May*<br>*Late = late May to mid-June* |
|---|---|
| Banded sunflower moth | Late |
| *Dectes* stem borer | Late |
| Grasshopper | Early |
| *Neotephritis finalis* (seed maggot) | Late |
| Red sunflower seed weevil | Early |
| Sunflower beetle | Late |
| Sunflower midge | Late (or staggered planting dates) |
| Sunflower moth | Late |
| Sunflower stem weevil | Late |

The calendar on page 16Y is intended simply as a guide to when fields should be checked for possible presence of various sunflower insect pests.

**3. Use of Economic Injury Levels and Economic Thresholds —** One major component of an IPM program is determining when tactics should be implemented to prevent economic loss. Economic loss results when pest numbers increase to a point where they cause crop losses that are equal to or greater than the cost of controlling the pest. An economic injury level (EIL) is defined as the pest density that will cause economic damage. An EIL recognizes that treatment is justified for some pest species while others are not of economic importance.

An economic threshold (ET) is the level of pest density at which tactics must be applied to prevent an increasing pest population from causing economic loss. Usually the ET is lower than the EIL. The ET has been defined most extensively for economic insect pests. Fewer ETs have been established for non-economic pests, such as sunflower root weevil or sunflower bud moth.

The ET varies significantly among different pest species. Economic thresholds also vary with pest development stages. Crop price, yield potential, crop density, cost and effectiveness of control, and environmental conditions influence the ET and EIL. Generally, ET increases as cost of control increases, and decreases as crop value increases.

Established ETs for major sunflower insect pests are summarized in the "Quick Reference Guide" on page 18Y.

**4. Cultural Control —** Cultural control strategies, such as staggered or delayed planting dates, can modify the cropping environment and often mitigate pest densities. Planting date is a sustainable method for effectively reducing yield loss and/or oil reduction caused by several insect pests. The above table summarizes research on planting dates for selected insects.

**5. Chemical Control —** Insecticides are a primary pest management strategy used for the control of sunflower insect pests in the United States, and there are many effective insecticides available. There currently are five different modes of actions, 15 different active ingredients, and more than 45 insecticides registered for insect control in sunflower.

To reduce any potential risk of insects developing genetic resistance to insecticides, producers should treat only when populations exceed the ET. If applying more than one application during the growing season, using the full rate of insecticide and rotating modes of action (*e.g.*, pyrethroids, organophosphates, neonicotinoid) will help prolong the effectiveness of available products and reduce the risk of insecticide resistance. Insecticide selection should take into account efficacy (kill), residual activity, resistance management, worker safety, price, availability and preharvest interval.

Once the decision to treat has been made, correctly applying and timing the spray application to achieve maximum control is critical. To optimize foliar coverage, growers should increase pressure (40 psi), increase carrier (10 gallons per acre (gpa) of water by land, 3-5 gpa by air) and use small droplet-size nozzles. Proper timing depends on the targeted insect pest. For most of the head-infesting insect pests (such as banded sunflower moth and red sunflower seed weevil), the "best" sunflower plant stage at which to treat is the R5.1 growth stage, or when pollen shed is just beginning.

Sunflower Beetles / Pat Beauzay, NDSU Ent.

Confection sunflower generally needs two or three applications of insecticide to protect against insect pests due to the industry's standards for low insect damage. In contrast, oilseed sunflower usually requires at least one well-timed insecticide application. Application at an earlier growth stage may be warranted if monitoring reveals higher-than-normal pest activity.

For flowering sunflower fields, foliar insecticides should be applied early in the morning or late in the day to minimize adverse effects on honey bees and other pollinators. It is also a good idea to select more bee-friendly insecticides, if possible. For example, one common sunflower insecticide, Asana® XL (esfenvalerate), actually has a bee repellent in the it that makes these fields unattractive for pollinators after treatment. Be sure to communicate with and notify local beekeepers at least 48 hours before the insecticide application.

The use of neonicotinoid insecticide seed treatments, such as Cruiser® 5FS (thiamethoxam), has increased dramatically in sunflower during the past several years. In the *2008 Pesticide Use and Pest Management Practices in North Dakota* (W-1446 NDSU Extension Service), 92% of sunflower acreage in North Dakota was treated with an insecticide seed treatment or an insecticide/fungicide combination.

One of the results of increased usage of insecticide seed treatments has been the general decline of populations of sunflower beetles. This was a fairly common economic insect pest of sunflower in the northern Great Plains in the 1980s. We also have seen the loss of the older chemistries of insecticides, such as lindane (an organochlorine) in 2007, due to health and environmental risks. These older insecticides applied to the soil or seed were very effective against sunflower stem weevil and wireworms and had long residual activity. Unfortunately, some of the newer neonicotinoid insecticides are not as effective in killing sunflower stem weevils.

**6. Host Plant Resistance —** Host plant resistance uses the plant's own genetic defense mechanisms to reduce the damage from insect pests. There are three major mechanisms of host plant resistance: 1) antixenosis — plants are not preferred by insects; 2) antibiosis — plants have an adverse effect on the biology of insects; and 3) tolerance — plants have inherent abilities to withstand the attack of insects.

Genetic resistance offers an alternative pest management strategy that can decrease economic losses from sunflower insect pests while also reducing input costs. It likewise can be integrated with pest management strategies, such as cultural and biological control. Resistance to certain sunflower insect pests (banded sunflower moth, sunflower moth, sunflower midge and sunflower stem weevil) has been identified in some developed sunflower germplasm and in some native sunflower species. The nature of the resistance mechanisms resulting in the reduced seed damage in the germplasm merits further investigation. ■

Knodel, J.J., G. Brewer, and L. Charlet. 2007. IV. Pest Management – Insects. *In* Sunflower Production, D.R. Berglund (ed.), NDSU Ext. Serv. A-1331 (EB-25 Revised). 26-53 pp.

Knodel J.J., L.D. Charlet, and J. Gavloski. 2010. Integrated pest management of sunflower insect pests in the Northern Plains. NDSU Ext. Serv. E-1457, Feb. 2010.

# Quick Reference Guide to Major Sunflower Insects

## — Occurrence, Injury & Economic Thresholds (E.T.) —

**Cutworms** (several species)
E.T. – 1 per sq. ft. or 25-30% stand reduction. Appear in early spring when plants are in the seedling stage, chewing them at or slightly above ground.

**Palestriped Flea Beetle**
E.T. – 20% of the seedling stand is injured and at risk to loss due to palestriped flea beetle feeding. Scout for flea beetles by visually estimating population on seedlings or using yellow sticky cards placed close to the ground.

**Sunflower Beetle**
E.T. – 1 to 2/seedling (adults), or 10 to 15/seedling (larvae). Adults appear in early June, larvae shortly thereafter. Both adults and larvae chew large holes in leaves.

**Sunflower Bud Moth**
E.T. – None. First generation adults appear in late May to mid-June, second generation adults in mid-summer. Larvae from 1st generation damage terminals and stalks whereas 2nd generation larvae feed in receptacle area.

**Longhorned Beetle *(Dectes)***
No scouting method or E.T. has been developed. Adults are present from late June through August. Larvae tunnel and feed in the petioles and stem pith and girdle the base of plants. Stalks often break at the point of larval girdling.

**Sunflower Stem Weevil**
E.T. – 1 Adult/3 plants in late June to early July. Adults appear in mid to late June with larvae in stalks from early July to late summer.

**Thistle Caterpillar** (Painted Lady Butterfly)
E.T. – 25 percent defoliation provided that most of the larvae are still under 1.25 inch in length. Adults appear in early to mid-June with larvae appearing shortly thereafter. Larvae chew holes in leaves.

**Sunflower Midge**
E.T. – none. Adult emergence begins in early July. Larvae feed around head margin and at base of the seeds causing shrinkage and distortion of heads.

**Sunflower Seed Weevils**
E.T. – Generally 8 - 14 adult red sunflower weevils per head (oil) and one per head (confectionery). Adults appear in late June to early July. Treat for red sunflower seed weevil at R5.1 to R5.4. Larvae feed in seeds from mid to late summer.

**Sunflower Moth**
E.T. – 1 to 2 adults/5 plants at onset of bloom. Adults are migratory and usually appear in early to mid-July. Larvae tunnel in seeds from late July to late August.

**Banded Sunflower Moth**
E.T. – Use either egg or adult sampling methods for determining E.T. Sampling should be conducted in the late bud stage (R-3), usually during mid-July. Adults appear about mid-July to mid-August. Larvae present in heads from mid-July to mid-September.

**Lygus Bug**
E.T. *for confection sunflower only* – 1 Lygus bug per 9 heads. Two insecticide sprays are recommended: one application at the onset of pollen shed or 10% bloom, followed by a second treatment 7 days later.

**Sunflower Headclipping Weevil**
E.T. – None. Adults appear in mid to late July and create feeding punctures around stalk just below the heads. Heads drop off.

***Note:*** *The insects discussed above are listed in the order that they are likely to occur throughout the growing season; however, the various insects may or may not appear, depending upon overwintering survival and environmental conditions as the season progresses. This table is intended simply as a guide to when fields should be checked for possible presence of the various insects known to infest sunflower.*

*SOURCE: Sunflower Production A-1331 (Revised EB-25 Revised). 2007. D.R. Berglund (editor). NDSU Ext. Serv.*

# — Tips For —
# Blackbird Control in 2012

**By Phil Mastrangelo***


Photo: Don Lilleboe

Make blackbird damage management a part of your sunflower production plan. Planning is everything. A proactive approach to address blackbird damage, if it occurs, is a much better strategy than a reactive approach. Use your previous experiences to help prepare for each sunflower growing season. The following six tips should be incorporated into the production plan to help reduce the effects of bird damage.

---

**1. Avoid planting sunflower near large stands of cattails.** The Prairie Pothole Region of North Dakota and South Dakota is heavily dominated by wetlands that have cattails as the primary vegetative cover. Cattail-choked wetlands provide ample nesting and roosting habitat for blackbirds. Consequently, the highest populations of blackbirds in North America are also found in the Prairie Pothole Region.

Sunflower fields that are planted in close proximity to large concentrations of blackbirds can sustain more than 20% damage. Sunflower producers should avoid planting in those areas where large concentrations of blackbirds are likely. Producers should also consider removing as much cattail habitat as they can. This can be accomplished by burning, disking or through the application of approved herbicides.

**2. Harvest sunflower as early as possible.** Efforts should be taken to reduce the amount of time sunflower is exposed to bird damage. The less time blackbirds have to feed on the crop equates to less overall damage to the crop. Growers should consider using desiccants to allow an earlier harvest of the sunflower crop. Recent advances have provided newer products that desiccate sunflower and also provide broadleaf weed control.

**3. Rely upon other cultural practices to reduce the potential for blackbird damage.** In addition to managing cattail habitat and the use of desiccants, sunflower producers should consider other cultural practices for reducing the impacts of blackbird damage. For example:

- Neighboring farmers should coordinate the planting date of their sunflower fields to reduce the potential for some fields maturing early and being more susceptible to bird damage.
- Plant "decoy crops " in close proximity of cattail wetlands to divert blackbirds away from commercial sunflower fields.
- Plant larger acreage of sunflower to spread the damage over a broader area.
- Delay fall plowing of harvested grain fields to provide an alternative food source for blackbirds.
- Practice good weed and insect control in sunflower crops to reduce potential food sources for blackbirds before the sunflower seeds ripen.

**4. There is no "silver bullet" for resolving blackbird damage.** Managing blackbird damage requires planning, persistence, commitment and the realization that no single method or technique will resolve the problem. Considerable effort has been taken to find the best method to resolve the blackbird problem. The "best method" is to use as many methods as possible.

In addition to the previously mentioned cultural practices, a bird harassment program should also be initiated. Most (75%) of blackbird damage to sunflower occurs within two and a half weeks after petal drop, so a harassment program should begin early — before blackbirds become habituated to feeding in sunflower fields. It is much easier to disperse birds shortly after they arrive in fields compared to birds that have been feeding in fields for several days or weeks.

Harassment techniques include the use of propane cannons, pyrotechnics and shooting. Propane cannons will disperse birds if they are deployed early, are moved to different locations, are elevated to allow the noise to project above the tops of the crop, and are maintained to ensure that they continue to operate properly. Pyrotechnics are noise-making projectiles fired from pistols. These devices travel considerable distance, so they help can help disperse birds from the interior of sunflower fields.

Shooting blackbirds helps reinforce the harassment provided by propane cannons and pyrotechnics, so all three methods should be employed. Federal and state laws allow the killing of blackbirds that are damaging crops or pose a threat to crops. Recent changes in federal regulations require that nontoxic ammunition be used when shooting blackbirds to protect crops. Also, sunflower producers must provide the U.S. Fish and Wildlife Service with an annual report detailing the types and

---

** Phil Mastrangelo is the state director for USDA-ARS-Wildlife Services in North Dakota.*

numbers of blackbirds killed each year.

Chemical repellents are registered to protect sunflower from blackbird damage. These products should be used according to their label and would be more effective if applied shortly after birds are detected in fields. While there have been varying reports of the efficacy of chemical repellents, producers should still consider them as an option for mitigating blackbird damage.

**5. Contact USDA Wildlife Services for assistance.** USDA Wildlife Services deploys field personnel to help mitigate blackbird damage in North Dakota and portions of South Dakota. The field staff can help producers develop a plan to manage blackbird damage.

Wildlife Services also has a supply of propane cannons available for loan at no cost to the producer. Wildlife Services will also distribute small quantities of pyrotechnics at no cost to producers. However, sunflower producers should plan on purchasing their own equipment to ensure that they can deploy harassment devices when needed. The cannons and pyrotechnics owned by Wildlife Services should be viewed as supplements to what the sunflower producers have in their own inventory.

Wildlife Services' field staff is also available to assist producers with the dispersal of blackbirds from troublesome areas. The demand on the field staff time is often high, but they will assist as many producers as possible. Similar to Wildlife Services' equipment inventory, the assistance provided by field staff should be viewed as a supplement to the efforts undertaken by sunflower producers. Producers who incorporate blackbird damage management into their sunflower production plan will be better prepared to reduce the effects of bird damage.

**6. Heavy bird damage typically occurs near edge of sunflower fields, but that doesn't imply that the same of amount of damage is evenly distributed throughout the field.**

Producers should not be surprised to see heavy bird damage on the edge of their sunflower fields. This is typical. However, that same level of damage may not be evenly distributed across the entire field. Walking toward the center of the field often indicates the variability in damage to the entire crop. Therefore, producers should not assume that their field is a complete loss and then stop any further efforts to mitigate the bird damage. ■

# — *Tips For* —
# A Smoother Harvest

**By Tim DeKrey***

Photo: Don Lilleboe

**1. Plant some of your sunflower acreage** to an early maturing hybrid to get started sooner on your harvest. It will also give you an opportunity to make sure your equipment is properly maintained and adjusted prior to harvesting the main portion of your crop.

**2. Scout your fields as the crop is maturing**, checking for diseases like Phomopsis and Sclerotinia; also, to determine whether desiccation may be warranted to speed drydown for earlier harvest on fields that may have disease or other issues. Those fields should be harvested first. If you don't have the time to scout, consider hiring a qualified person to do it for you.

**3. As part of the scouting process, do yield estimates.** The National Sunflower Association has worksheets and a formula to assist with developing yield estimates that are quite accurate, if you pull enough samples. This can help you line up adequate storage and aeration if temporary storage is needed.

**4. If storing sunflower seeds on your farm**, make sure your bins are ready: fans operational, heaters and stirring equipment in good operating condition, etc. Even new equipment can have issues, as we found out the hard way on a one-year-old bin we used for sunflower. Also, rodents can create problems with buried service wires to bins and by chewing up sensors in drying equipment.

**5. Clean all harvesting equipment thoroughly** — especially if you're producing in-shell or hulling-type 'flowers. There can be literally bushels of corn or soybeans left behind if you still have uncleaned combine hoppers, unswept hoppers on trailers, unclean swing augers, etc. Processors don't like surprises.

**6. Once the small grain harvest is over**, examine your sunflower head to at least remind yourself of any maintenance issues carrying over from the previous year's harvest season.

**7. Start harvest with a really clean combine** — and keep it clean to help avoid fire issues. There may be some shielding that provides areas for dust and trash to accumulate that could be removed without affecting combine performance. *(But, don't compromise safety!)*

**8. If you have a field with a weed problem** for whatever reason, consider screening the sunflower seeds as they go into storage. Doing so may slow you down, but it also can prevent storage problems due to weed seeds and wet plant materials. ■

---

** Tim DeKrey farms near Steele, N.D. He is a current director and past president of the National Sunflower Assn.*