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G91-1026 Sunflower Production in Nebraska

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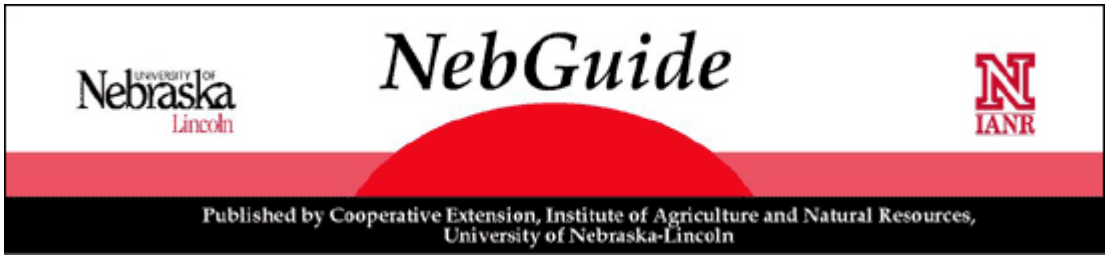

Sunflower Production in Nebraska

Seeds, seedbed preparations, fertilizing and controlling weeds in sunflowers are among the topics covered here.

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Sunflowers are native to Nebraska. Cultivated for centuries by native American Indians as a food crop, sunflowers were taken to Europe in the mid-16th century. Oilseed sunflowers have been a U.S. crop since 1986.

Sunflower production is divided into two market classes, oil and confectionery. The oil type is by far the most commonly grown market class. Recent health trends have brought sunflower cooking oil into prominence because the oil is low in saturated fats.

Confectionery types are grown for the edible roasted sunflower seed market, and are produced under strict contract guidelines. Seed size is critical, with small seeds designated for bird seed market channels. Growing the confectionery type without a contract is risky.

Sunflower production of both market classes is currently around 30,000 acres in Nebraska. Recently a third market class has started to develop based on high oleic acid content, which gives products better shelf life.

Sunflowers in the Rotation

As with any other crop, the sunflower responds to good management practices, including desirable placement within the rotation.

Figure 1. Sunflowers grown as part of a three strip rotation system in the Nebraska Panhandle. Sunflowers follow wheat in the rotation and wheat follows the fallow each year.

While sunflowers grow well on summer-fallowed land, their deep extensive root system allows them to perform well when planted in rotation following shallow-rooted cereals (*Figure 1*). The deep-rooted full-season nature of sunflowers often results in significant soil water depletion.

In the lower rainfall areas of western Nebraska it may be necessary to summer fallow fields previously planted to sunflowers prior to planting winter wheat.

If the winter annual grasses, e.g., downy brome, jointed goatgrass and rye, have become a problem in a field, sunflowers in the rotation provide the producer with additional opportunities to exercise control. The control may be provided by additional tillage opportunities and/or the use of effective grass herbicides not available for use in a wheat/fallow, wheat/millet/fallow or continuous wheat rotation (see **Weed Control** below).

Sunflowers are susceptible to triazine and sulfonylurea herbicide residue in the soil. Oats, wheat, barley and soybeans all exhibit greater tolerance to these herbicides than do sunflowers. Therefore, sunflowers should not be planted where carry-over may be a problem.

Sunflower residue during the winter months is minimal, so soil is subject to loss by wind and water. Because the sunflower crop leaves the soil mellow, erosion problems may carry over to the following seeded wheat field. The potential for soil loss can be reduced significantly by growing sunflowers in strips with winter wheat and/or stubble fallow.

The sunflower is a host for diseases also found in other crops. Verticillium wilt is found in potatoes, safflowers and sunflowers. Sclerotinia white mold is a disease found in dry edible beans, flax, rapeseed, soybeans, mustard, sugarbeets and sunflowers. No more than one of these crops should be grown in the same rotation cycle in fields infested with these diseases.

Seed Quality and Selection

Many commercial seed companies have taken on sunflower seed lines. Most of the seed currently available for planting is hybrid seed. There is a wide range of heights and maturities available from these companies.

Sunflower varieties are tested yearly at the High Plains Ag Lab in Sidney and published in the *Nebraska Proso and Sunflower Variety Tests*, EC107.

Oil type sunflowers should have over 40 percent oil in the seed, and an average test weight of 28 pounds per bushel.

Seedbed Preparation

Sunflowers will grow in a no-till environment, but most soil-applied herbicides currently labeled for use on sunflowers require incorporation (see **Weed Control** below). A seedbed similar to that for corn should be suitable for sunflowers. Seed should be placed into a firm, moist soil. A firm seedbed retains the moisture near the surface and permits a shallower planting to allow for a more rapid and even emergence.

Sunflowers don't provide rapid soil cover. A roughened soil surface should be created to reduce the potential of blowing soil injuring the base of growing sunflower plants.

Fertilizer

Sunflowers respond to fertilizer applications when the soil's nutrient levels are low. Growing high yielding, high quality sunflowers requires fertilization based on soil test results to determine current fertility level. Sunflowers grown under dryland conditions have requirements similar to those of small grain. Sunflowers grown under irrigation require a higher plane of fertility. Excess nitrogen can contribute to decreased seed oil content.

Sunflower seed is sensitive to the salts in fertilizer. Use extreme care to avoid germination damage. Limit seed application to a total of 10 pounds of nitrogen and potassium.

Planting Time and Rates

Sunflower seeds germinate at soil temperatures above 50° F. A sunflower in the seedling stage can withstand some frost damage. Sunflowers generally are planted in early to mid June and some varieties can be planted as late as July 15. Planting after June 5 helps avoid damage from insects.

Planting is done with a row crop planter equipped with sunflower plates, or with a grain drill. When using a grain drill, exercise care to prevent the seed from being crushed by the feeding mechanism. If drill row spacing is less than 12 inches, it is best to block off every other row.

Place seed one to two inches deep. Seed placed deeper will emerge, but percent emergence will be less irregular. This variation in emergence may make insect control more difficult later in the season during flowering.

Seeding rates depend on the variety selected, but most varieties grown under dryland conditions should be planted at 14,000-21,000 plants per acre, and under irrigationd conditions, 20,000-25,000 plants. Plant emergence should be in the range of 85-90 percent.

Weed Control

Several good pre-plant herbicides are available for use in sunflowers. The dinitroaniline herbicides, e.g. Prowl, Treflan and Sonalan, all require soil incorporation. They provide excellent control of barnyardgrass, crabgrass, downy brome, jointed goatgrass, fall panicum and foxtail. The dinitroanilines also provide good control of kochia, lambsquarters, pigweed, Russian thistle and sandbur.

Prowl and Treflan are the most cost effective herbicides presently available for use in sunflowers. Lasso herbicide is also available for pre-plant use in sunflowers. It may be surface mixed within seven days before planting, or applied preemergence within five days after planting. Lasso provides similar control for the weeds previously mentioned, but it provides poor control of Russian thistle and only fair control of sandbur. Application rates of these herbicides vary with soil texture and organic matter content. Refer to *EC130, A Guide for Herbicide Use in Nebraska,* for specific application rates and precautions.

A postemergence application of Poast + Dash + 28 percent UAN may be used to control annual grasses less than four inches tall. Good spray coverage is essential with this treatment. Refer to *EC130, A Guide for Herbicide Use in Nebraska,* for specific application rates and precautions.

Weed control in sunflower plantings also may be provided by tillage. The rotary hoe may be used up until the six leaf stage. Stand losses are usually less than 5 percent if the sunflower has at least two fully exposed leaves beyond the cotyledons, and preferably 4-6 leaves.

The rotary hoe is more effective and less damaging when used in the dry afternoon, compared to the early morning. The rotary hoe at 10 mph is an excellent weed killer and crust breaker.

Normal cultivation after sunflowers are six inches tall provides effective weed control. Cultivation should be shallow to avoid pruning roots. Avoid cultivation closer to the plants than the leaf spread of the plant.

Sunflower Insects

Because the sunflower is a native Nebraska plant, the plants harbor a wide array of insects. Many of these insects are beneficial, but sunflowers do have a number of pest species that can cause economic problems. It is important to scout sunflowers throughout the season, but particularly during the pre-bloom and early blooming periods. Adherence to thresholds is important to avoid economic losses from unnecessary application or insect damage. Proper timing is essential for minimal damage and optimum control.

Figure 2. Sunflower seed weevils on sunflower petal at flowering. Sunflower seed weevils are a major pest of sunflowers in Nebraska, especially confectionery types.

If insecticide use is necessary, the potential hazard to bees needs to be considered. This is especially true during the flowering period. Many commonly used insecticides are toxic to bees. All sprays on sunflowers should be coordinated with local beekeepers, and spraying blooming sunflowers should be done late in the evening or early in the morning.

The potential for early season insect problems in sunflowers is relatively low. Under some conditions, however, cutworms or the sunflower beetle may cause a problem by defoliating or cutting young plants. Treatment would be warranted if the plants are being severely defoliated, or substantial stand loss occurs.

Mid-season problems can result from defoliating insects, including sunflower beetle larvae and

grasshoppers. Defoliation levels need to exceed 25 percent with insects actively feeding to warrant treatment. During vegetative growth, stem weevils and sunflower maggots may be laying eggs in the stem of the sunflower. These insects are difficult to find, and have not caused significant problems in Nebraska in the past.

The major insect pests that occur in Nebraska attack the developing seed in the head. These insect pests must be detected before they enter or lay their eggs in the seeds or the head, or control will not be effective. Sampling for these insects must take place when the sunflower is in the very late bud to early blooming stages. The major pests at this time are the seed weevil, the banded sunflower moth, and the sunflower moth (*Figure 2*).

The sunflower moth lays its eggs on heads in the very early stages of flowering. The larvae develop on the flower and later tunnel into the seed. Sampling for sunflower moths should be done in the evening when the moths are active.

The threshold for the sunflower moth is 1-2 moths per five plants, and treatment should occur within a few days after the moths are seen. Fields not blooming or in late bloom when sunflower moths are active have a low potential for damage. The date for planting sunflowers in many areas of Nebraska has been adjusted to avoid major problems from this insect.

The second major group of head-infesting sunflower pests is the seed weevil. The grey seed weevil is more likely to be present during the late bud stages, and the red seed weevil is more prevalent during the flowering stages.

The need for control should be assessed early in the flowering stages (before 10 percent of the flowers in the head have formed) in order to avoid oviposition, or egg laying, in the developing seed. For oil sunflowers, 14 seed weevils need to be present on each head to warrant treatment. One seed weevil per head causes significant damage on confectionery sunflowers.

The banded sunflower moth lays its eggs on the bracts of developing buds. Sunflowers not in the bud stage when moths are present are not as susceptible to damage, so the planting date greatly influences the seriousness of this insect. Late planting in early June has reduced the importance of this pest.

One additional insect pest that often is very noticeable, but causes little damage, is the head clipper weevil. This insect usually is restricted to the margins of fields, and is not present in enough numbers throughout the field to justify treatment. If this insect begins to cause significant damage, the percent of cut heads and the presence of weevils should be used to reach a decision as to when an economic loss will result.

Sunflower Diseases

While most sunflower diseases are not a major problem in western Nebraska, the potential for some devastating diseases exists.

Sclerotinia stalk and head rot has been a serious problem in more humid geographical production areas. This disease is caused by the fungus *Sclerotinia sclerotiorum*, the incitant of the serious and widespread white mold disease of irrigationd dry beans.

The fungus persists for many years in the soil, and sunflowers grown in rotation with dry beans are exposed to high levels of inoculum.

Plants infected at the soil level develop a canker that girdles the stem, resulting in wilting and death. The canker is soft and water-soaked. A growth of white mold appears on the surface and develops into fuzzy clumps (*sclerotia*) that turn black. The head rot phase of the disease occurs after flowering during extended periods of rain and high humidity. Head rot has not been observed in western Nebraska.

Dryland sunflowers in western Nebraska are not grown in rotation with dry beans or other hosts of the causal fungus, so the inoculum level in the soil is seldom high. Since the soil surface is dry during most of the growing season, and extended periods of rain or high relative humidity are rare, this disease has not required special control practices.

Under irrigationd conditions general preventive practices include: 1) plant seed free of sclerotia, 2) avoid rotations with dry beans or soybeans, 3) avoid sunflower/sunflower rotation, and 4) avoid excess fertilization.

Rust, caused by *Puccinia helianthi*, can be a serious problem in susceptible varieties. Inoculum may be available from infected wild sunflowers growing near most commercial fields. Rust symptoms normally are not observed until flowering.

Cinnamon-colored spots appear mostly on the leaves. The spots turn black in late season as summer spores are replaced by overwintering spores. Severe rust can reduce yield, seed size, test weight, and nutmeat-to-hull ratios.

Rust is controlled most effectively by planting resistant varieties. Destroying volunteer plants in early spring and controlling wild sunflowers grown in the vicinity of commercial fields reduces initial inoculum.

Other potential sunflower diseases include downy mildew, Verticillium wilt, Phoma black stem, Alternaria leaf and stem spot, Septoria leaf spot, Rhizopus head rot, charcoal rot, and powdery mildew.

Harvesting Sunflowers

Sunflowers are mature when the backs of the heads are yellow and the outer bracts begin to turn brown. Sunflowers can be direct harvested when the seeds reach a storage moisture of eight or nine percent.

Sunflowers can be harvested at higher moisture contents and dried down to nine percent moisture. This may be particularly advantageous if lodging, birds or head rot are causing widespread problems.

The use of a combine with special extensions in front of the cutter bar (sunflower pans) works best. The pans help keep the heads from falling away from the header. Other types of attachments work, but the loss of seed from shattering soon would pay for the pans.

The cylinder speed must be slow enough to avoid cracking the seed, approximately 300 rpm. The concave must be open enough to avoid grinding up the head.

Sunflower seed easily blows over the chaffer and sieve. Excessive wind can cause the seed to blow over the tailings auger. Seed forced into the tailings auger returns through the cylinder and may be dehulled in this process.

Adjust the wind to keep the trash just floating on the sieve. Adjust chaffer and sieve for minimum tailings return.

When the combine is properly adjusted, the threshed heads come through only slightly broken, and blank seed remains in the head. Dockage should be less than five percent with little or no hulled seed.

Additional References

Sunflower Production and Pest Management. Extension Bulletin #25. North Dakota State University. Fargo, ND 76 p.

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