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5-2000

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Grady, Kathleen, "Sunflower Production" (2000). *Extension Circulars*. Paper 478.
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Sunflower Production



SOUTH DAKOTA STATE UNIVERSITY
College of Agriculture & Biological Sciences
Cooperative Extension Service

Sunflower Production

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HYBRID SELECTION

The success of sunflower production is greatly affected by choice of hybrid. When selecting a hybrid, carefully consider these characteristics:

- yield potential
- oil content
- maturity
- stalk strength
- pest resistance or tolerance

Choose hybrids with characteristics that best suit your needs and production practices. Hybrids available include oilseed (traditional, NuSun, or high-oleic) and non-oilseed (also called confectionary) types.

Yield potential

Evaluate as much performance information as possible. Yield trial results from university experiment stations, commercial company trials, strip tests, and demonstration plots will identify hybrids that are consistently high yielding. Give more weight to information from trials or neighbors' fields close to home and look at relative performance over many locations and years.

Average annual sunflower yields in South Dakota ranged from 820 to 1631 lbs/A and averaged 1240 lbs/A from 1980 to 1998. With adequate fertility and moisture, the best-producing hybrids in an area may produce 2000 lbs/A or even 3000 lbs/A under ideal growing conditions.

Oil content

Select a high-oil hybrid over a low -oil hybrid with the same yield potential, but don't sacrifice yield in favor of oil content. The oilseed sunflower market pays a premium based on market price for over 40% oil (at 10% moisture) and discounts for oil less than 40%.

Maturity

Later-maturing hybrids generally yield higher than early hybrids. Most hybrids can be har-

vested 100-120 days after planting. Maturity is especially important if planting is delayed. Often, with delayed planting, only an early hybrid will mature. Reduced yield, oil content, and test weight result when a hybrid is damaged by frost before it is fully mature.

Pest resistance or tolerance

Most sunflower hybrids in the United States have resistance to *Verticillium* wilt, certain races of downy mildew, and two or more races of rust. Some hybrids differ in tolerance to midge damage. Consult the seed company for information on the reaction of a particular hybrid to these and other pests.

PLANTING

Field selection and rotation

Well-drained soils with a high water-holding capacity are most suitable for sunflower production, although sunflower will tolerate a variety of soil conditions. Avoid fields with a heavy weed history or where perennials are a problem, as herbicide options are limited. Sunflower is sensitive to carryover residues from several herbicides. Follow recommended planting intervals listed on product labels for sunflower planted the season following herbicide use.

Rotation with other crops is essential for successful sunflower production. Problems likely to occur in fields where crops are not rotated include:

- disease and insect buildup.
- increasing populations of certain types of weeds and of volunteer sunflowers.
- depletion of soil moisture.
- phytotoxicity of sunflower residue to the following sunflower crop.

Rotations of at least 4-year spacings between sunflower crops are recommended to help reduce these problems. Some suggested rotations for eastern or central South Dakota might be sunflower, small grain, small grain

or flax, winter wheat; or sunflower, small grain, wheat, soybean, wheat or corn. For western South Dakota, sunflower, spring wheat or fallow, winter wheat, small grain or corn is a possible rotation.

Seedbed preparation

Prepare the seedbed to provide a firm, moist environment for seed germination. Conventional tillage systems usually involve two or more tillage operations to kill weeds or incorporate pre-emergence herbicides. Avoid excessive or deep tillage in the spring, as this dries out the soil.

Sunflower can be grown under reduced tillage or no-till systems, but particular attention must be paid to weed control. A uniform stand planted in narrow rows will help reduce late-season weed problems. Burn down emerged weeds at planting. Refer to the weed control section for herbicide options for no-till sunflowers.

Planting date

Sunflower may be planted over a fairly wide range of dates from early May to late June. Soil temperature should be at least 45-50 F. A temperature of around 50 F is required for seed germination. Generally, dates from May 15 to June 25 will give the best yields, but adjust the planting date for the season.

Planting dates before May 15 or after June 15 may help avoid some seed weevil damage but yields have generally been disappointing. Early-planted fields may also experience increased damage from the banded sunflower moth.

Seed oil content often decreases significantly when planting is delayed beyond about June 15. Select early-maturing hybrids for late seeding dates or replanting.

Planting depth

Ideal depth is 1.5- 2.5 inches and into moisture. Do not plant deeper than 3 inches. Soil crusting may be a problem with some soils. Use a rotary hoe to break the crust if crusting occurs.

Seeding rate

Seed sunflower at a rate 10-15% above the desired final population.

Row spacing

Base choice of row spacing on planting and harvest equipment available and individual production practices. Sunflower can be grown successfully at row spacings from 12 to 40 inches, but performance has generally been best at spacings between 20-30 inches. Recently, there has been increasing interest in narrow-row or solid-seeded sunflower. Seeding in row spacings of 12, 15, or 18 inches is usually accomplished with an air drill. Research has shown that narrow rows can yield as much or more than conventional 30-inch rows, provided that weed control is adequate. There are no postemergence herbicides for broadleaf weed control after sunflower emerges, and cultivation is not an option in narrow-row sunflower.

Proper planter calibration is essential, regardless of row spacing.

Plant population

Desired, final population will depend on soil type and moisture conditions. For oilseed sunflower on lighter soils or where normal rainfall may be inadequate, populations of 16,000-20,000 plants/acre are recommended, while on heavier soils, final stands of 18,000-22,000 plants/acre are desired. Populations for confection types should be 15,000-18,000 plants/acre. Increase populations by 2,000-4,000 plants/acre for sunflower planted in narrow rows of 15 inches or less, to provide faster canopy cover to suppress weed growth.

Sunflower has the ability to compensate for low populations by producing larger heads and heavier seeds. Very low populations may produce lower oil contents, due to an increased hull-to-meat ratio of larger seeds. Higher populations will result in smaller heads and faster drydown, but may also produce thinner, weaker stalks and increased lodging.

FERTILIZATION

Soil testing is the most reliable method for determining fertilizer needs. Nitrogen is generally the most limiting nutrient for sunflower production. About 5 lbs of nitrogen are required for each 100 lbs of sunflower seed yield. Recommended rates of nitrogen fertilizer application will vary with the yield goal de-

sired and the nitrate nitrogen soil test level. Where the soil has not been tested, a rule of thumb is to apply 3-5 pounds of nitrogen fertilizer per 100 pounds of expected yield.

Apply phosphate and/or potassium fertilizer when soil test levels are low to medium for these nutrients. On most soils, banding of P or K near the seed is most efficient. See SDSU Cooperative Extension Service publication EC 750, Fertilizer Recommendations Guide, for recommended phosphate and potassium application rates.

Sunflower seeds are very sensitive to fertilizer salts. When planted in 30-inch rows, do not apply fertilizer in contact with the seed. With 7-inch row spacing, limit nitrogen plus potash placed with the seed to 10 lbs/A. Reduce the rate proportionately for wider row widths. Urea-based fertilizers, UAN or DAP (18-46-0) should NOT be placed in contact with the seed, and limit 0-46-0 to 200 lbs/A material.

WEED CONTROL

Destroy emerged weeds with tillage or a burn down herbicide (no-till) immediately before planting. A rotary hoe or harrow may be used to control seedling weeds. After crop emergence, delay harrowing until the sunflowers have four leaves. Use row cultivation or herbicides to control weeds during the season.

Labeled herbicides for control of grassy and broadleaf weeds in sunflower include the following:

Glyphosate Products—Preplant or preemergence burn down; grasses and broadleaves. Roundup Ultra may also be used through hooded sprayers to control weeds between the rows.

Treflan (trifluralin)—PPI; most annual grasses, small-seeded annual broadleaves. Spray or granules may be applied either spring or fall, incorporation within 24 hours. Granules preferred for fall application.

Prowl or PendiMax—PPI or early preplant surface (for no-till); most annual grasses, small-seeded broadleaves. Fall or spring application with immediate incorporation, or

surface application up to 30 days before planting in no-till systems.

Sonalan—PPI; most annual grasses, small-seeded broadleaves. Granules or spray may be applied in the spring, incorporation within 48 hours. Granules only may be applied in the fall, incorporate as soon as possible, within two days.

Eptam—PPI; most annual grasses, wild oats. Incorporate immediately.

Eptam + Treflan, Eptam + Sonalan—PPI (tank-mixes); most annual grasses, wild oats, some small-seeded broadleaves. Incorporate immediately.

Spartan—Early preplant or preemergence; annual broadleaves. A special Section 18 label was approved for use on sunflower in conservation tillage systems in 1999. Labeling for 2000 is pending. Apply a maximum of 10 to 14 days prior to planting or within 3 days of planting. Rainfall required before weed emergence.

Poast—postemergence; annual grasses, quackgrass suppression. Always add crop oil concentrate with Poast.

Assert—postemergence; wild mustard, wild oats. Use surfactant or crop oil.

Gramoxone Extra or Cyclone (paraquat)—harvest aid or burn down (no-till). Desiccant to hasten drying in the fall. Apply after sunflower is physiologically mature. Also may be used as a burn down to control emerged weeds prior to crop emergence, and with directed, shielded equipment to control emerged weeds between the sunflower rows.

Sodium Chlorate or Leafex-3—harvest aid. Apply when crop is physiologically mature to speed drydown.

See SDSU Cooperative Extension Service Publication FS 525-OS, Weed Control in Oilseed Crops (revised annually), or the product label for complete information on application rates, timing of application, and weed and crop response. Always follow label instructions for best results.

CONTROLLING DISEASES

There are a number of diseases affecting sunflower in the Northern Great Plains that can be of economic significance. The most important of these are Sclerotinia diseases, downy mildew, rust, Phoma black stem, and premature ripening. Alternaria and Septoria leaf spots, Phomopsis stem canker, Verticillium wilt, and Botrytis and Rhizopus head rot can occur but usually are infrequent or of insufficient intensity to cause economic losses.

The most economic and effective way to control sunflower diseases is to plant resistant or tolerant hybrids (if available) and to use a minimum of four years rotation between successive sunflower crops. Monitoring fields for the presence and severity of disease in the current year will help determine the length of rotation away from sunflowers.

Sclerotinia diseases

Sclerotinia (white mold) diseases are among the most serious disease problems on sunflower. The Sclerotinia fungus, *Sclerotinia sclerotiorum*, attacks many broadleaf crops including sunflower, soybean, dry beans, canola, field peas, mustard, alfalfa, flax, crambe, buckwheat, safflower, and lentils. Many broadleaf weeds are also hosts.

Sclerotinia sclerotiorum causes three distinct types of diseases on sunflower: wilt, middle stalk rot, and head rot. Wilt is most common and can cause severe yield losses. Wilt occurs whenever sunflower is planted on Sclerotinia-infested soil, regardless of environmental conditions. The fungus infects sunflower plants through the roots and then grows up into the stem. The disease is characterized by a sudden wilting of leaves at or after flowering, root rot, and a basal stem canker. Usually several adjacent plants are affected. The stalk becomes bleached and often appears shredded. When infected stems are split open, small, hard, black fungal bodies called sclerotia can be found in the rotted tissue.

Sclerotinia middle stalk rot and head rot are caused by airborne spores of the fungus and occur sporadically in sunflower. Under prolonged moist soil conditions, sclerotia in the soil germinate and produce mushroom-like structures called apothecia that release as-

cospores into the air. The spores require water and a food base such as dead or dying plant tissue to germinate and infect or infect through wounds. They can infect sunflower stalks by landing on damaged leaves or in water and dead pollen that accumulates in the leaf axils. Heads are infected by ascospores via the dying florets.

Symptoms of Sclerotinia middle stalk rot begin as a tan to gray lesion that eventually girdles the stalk. The stem becomes bleached and shredded and sclerotia develop in the infected tissue.

Head rot caused by *Sclerotinia sclerotiorum* is characterized by bleached, skeletonized head tissue interspersed with large sclerotia. Sometimes the entire seed layer falls away. Infected heads often shatter during combining, and sclerotia become mixed in with the seed. Yield losses can be severe.

No sunflower hybrids completely resistant to Sclerotinia diseases are available, although commercial seed companies are in the process of developing hybrids with partial resistance. No fungicides are currently labeled for control of either wilt or ascospore infection of sunflower. The most important management tool for controlling Sclerotinia is rotation to a non-susceptible crop such as small grains or corn along with control of broadleaf weeds that may also be susceptible.

Do not plant sunflower in or adjacent to previously infested fields of any Sclerotinia-susceptible crop. A three- to five-year rotation interval to a non-host crop is usually sufficient with low disease incidence, but six to eight years or longer may be required for heavily infested fields.

Downy mildew

Downy mildew most often infects sunflower in the seedling stage, and infection is favored by cool, water-logged soils. Symptoms include dwarfing and leaf yellowing (chlorosis), with the appearance of white cottony growth on the undersides of the leaves. Plants that survive will often produce heads that face straight up, with little or no seed. Some hybrids are resistant to two or more races, but at least nine races are known to occur in the United States.

Fungicide seed treatments (such as Apron) are commonly used to protect germinating seedlings against downy mildew. However, an Apron-resistant strain of the fungus has been discovered recently in the Northern Plains. Apron is ineffective against this new strain. Other fungicides are being investigated, but none give complete control. Other management tools include extended crop rotations, destruction of volunteer sunflowers, and avoiding poorly drained fields.

Phoma and Phomopsis stem diseases

Both Phoma and Phomopsis diseases are characterized by stem lesions. Phoma is more widespread and is caused by a soilborne fungus, *Phoma macdonaldii*. Phoma black stem is distinguished by large (up to two inches), jet-black lesions on the stem. Lesions may also appear on the leaves and on the back of the head. Stem lesions often are associated with the point of leaf attachment. Infected plants may produce lower seed yields and are more susceptible to lodging.

Phomopsis stem canker, caused by *Phomopsis helianthi*, is characterized by large, tan to light brown stem lesions that typically surround the leaf petiole. Phomopsis lesions usually are much larger (up to six inches) than lesions caused by Phoma and are lighter in color.

The fungi causing both diseases overwinter in infected debris. Phoma can also be carried and spread by stem weevils. Reduce disease incidence by rotation, tillage to bury crop residue, and good insect control.

Rust

Sunflower rust, caused by *Puccinia helianthi*, is manifested by cinnamon-colored leaf and stem spots that generally appear in the late summer. The fungus is favored by warm temperatures and high humidity or frequent dew. Severe rust infections reduce yield, oil content, seed size, and test weight.

Until recently, most sunflower hybrids were rust-resistant, but new races have developed that are capable of attacking most or all currently grown hybrids. Avoid planting hybrids that were severely rusted in your area previously. Destroying volunteer and wild

sunflowers early in the season, avoiding high plant populations and high rates of nitrogen fertilizer, and planting early can minimize the risk of loss in susceptible hybrids.

Premature ripening

Premature ripening is characterized by early dying and blackening of plants, frequently in patches in the field. Phoma girdling is often the cause of premature ripening, although Sclerotinia stalk rot, rust and other leaf diseases, and charcoal rot may also cause early dying. Stress appears to enhance disease development. Management is confined to crop rotation of three to four years.

Alternaria and Septoria leaf and stem diseases

Alternaria leaf and stem spot is distinguished by dark brown, irregularly-shaped spots on leaves and stems. Leaf lesions may have a yellow halo. The lesions on leaves or stems may coalesce to form large, blackened areas. Stem lesions are not associated with leaf petiole attachment.

Septoria also produces leaf lesions. Spots become brown and roughly diamond-shaped, often with a yellow halo. The disease begins on the lower leaves and spreads to the upper leaves.

Both Alternaria and Septoria diseases are favored by warm, humid environments. Severe damage in the Northern Great Plains is rare. Crop rotation and destruction and burying of infested crop refuse are the only management practices.

Verticillium wilt

Verticillium wilt is caused by a seedborne and soilborne fungus with a wide host range. In sunflower, the disease is characterized by yellowing between the leaf veins. As the disease progresses, yellowed areas turn brown and dead. The disease starts with the lower leaves and moves up the plant. Symptoms usually appear around flowering. The disease may be serious on lighter soils. Many commercial sunflower hybrids possess resistance to Verticillium. Crop rotation and avoiding fields with a history of Verticillium wilt will reduce disease incidence.

CONTROLLING INSECTS

A number of insect pests can cause serious losses in sunflower, including sunflower beetle, sunflower stem weevil, red seed weevil, banded sunflower moth, and sunflower midge. Crop rotation, cultural practices, beneficial insects, resistant or tolerant varieties, and chemical controls are among the tools used to reduce pest populations.

Monitor fields closely and treat when insects reach economic threshold (ET) levels. ETs will vary somewhat with the market price of sunflowers and the cost of insecticides and application. Refer to SDSU Cooperative Extension Service Publication FS 888-OS, Insect Control for Oilseed Crops, for recommended sampling procedures and a list of registered insecticides for control of sunflower insect pests. Additional information can be found on the SDSU extension entomology website: www.abs.sdstate.edu/plantsci/ext/ent

Cutworms

Several species of cutworm larvae attack sunflower seedlings. Larvae are dirty-gray to gray-brown in appearance, 0.25 to 1.5 inches long. Larvae cut off seedlings above or below the soil surface. Feeding typically occurs at night. During the day, larvae can usually be found just under the soil surface near the base of recently damaged plants.

Begin scouting for cutworms at plant emergence and continue at least twice per week until mid-June.

- ET—One larva per square foot or 25-30% stand reduction.
- Control—Several insecticides are registered for cutworm control in sunflower.

Stem Weevils

Two species of stem weevils damage sunflower. The adult black sunflower stem weevil, *Apion occidentale*, is black and about 0.1 inch long, with a narrow snout protruding from its head. The spotted sunflower stem weevil adult, *Cylindrocopturus adspersus*, is larger (about 0.19 inch long) and grayish brown with white spots. Black stem weevil adults usually emerge earlier than spotted stem weevils, which emerge in mid to late

June. Females of both species lay eggs in the epidermal tissue of the stem, and larvae hatch and tunnel in the pith area of the stalk.

Feeding by sufficient numbers of spotted stem weevil larvae (25-30 per stem) can cause weakened stems susceptible to lodging. Damage caused by black stem weevil larvae has been considered negligible to date. However, adults of both stem weevil species are suspected of acting as vectors to transmit Phoma black stem disease in sunflower.

Begin scouting for spotted sunflower stem weevils in late June to very early July. It is necessary to approach plants slowly while scouting, as the adult weevils will drop to the soil and “play dead” when disturbed.

- ET—One spotted stem weevil adult per 3 plants in late June or early July. No threshold has been established for black sunflower stem weevils.
- Control—Spray with labeled insecticide in late June or early July, before appreciable egg laying has occurred. Fall tillage to bury or break up sunflower stems will increase winter mortality of larvae. Delaying planting until late May or early June may reduce larval density in the stalks.

Sunflower Beetle

Adult sunflower beetles closely resemble Colorado potato beetles but feed exclusively on sunflowers. They have a reddish-brown head and cream-colored back, with three dark stripes on each wing cover. Larvae are yellowish green, humped-backed in appearance, and about 0.35 inch long. Adult sunflower beetles emerge in late May or early June and feed on sunflower seedlings. Eggs are laid on stems and leaves and hatch in about one week. Both adults and larvae chew large holes in leaves. If beetles are numerous, sunflower fields may be severely defoliated.

- ET—One to two adults per seedling or 10 to 12 larvae per plant, or 25-30% defoliation before the majority of larvae have reached maturity.
- Control—Apply labeled insecticide while larvae are actively feeding.

Red and Gray Sunflower Seed Weevils

Two species of seed weevils attack sunflowers. The most damaging of these is the red sunflower seed weevil, *Smicronyx fulvus*.

Adult red seed weevils are about 0.1 to 0.12 inch long and reddish-brown in color. Gray sunflower seed weevil adults, *Smicronyx sordidus*, are slightly larger than the red seed weevils and gray in color. Larvae of both species are small, cream-colored, legless, and C-shaped.

Red seed weevil adults emerge in late June to early July. Peak gray seed weevil emergence occurs about 10 days earlier than peak red weevil emergence. Adult weevils of both species feed on sunflower floral buds and/or pollen. Gray seed weevil females begin oviposition before red seed weevils and lay fewer eggs than red seed weevil females.

Eggs are deposited in developing seeds, normally one egg per seed. Larvae feed in a single seed, consuming part or all of the kernel.

Begin field monitoring as soon as sunflower ray petals start to form, and continue to monitor every two to three days thereafter. A more precise count of seed weevil adults can be obtained by spraying the heads with a mosquito repellent containing DEET. This chemical will cause the weevils to move out from between the florets.

- ET—Approximately 14 adult red weevils/plant (oil) or one adult red weevil/plant (confection). Gray seed weevil damage to oilseed sunflower usually does not reach economic levels. However, gray seed weevil populations may reach sufficient levels to warrant treatment in confection sunflower fields.
- Control—Spray with labeled insecticide when at least 30% of plants are in early bloom (R-5.1 to R-5.4 stage). For gray seed weevils, treat at late-bud stage (R-3 to R-4). More than one treatment may be necessary.

Sunflower Moth

The adult sunflower moth is about 0.38 inch long, buff to gray in color, and roughly cigar-shaped when at rest. Larvae are brown with light-colored stripes running the length of the body, about 0.75 inch long. Adult sunflower moths migrate into South Dakota from

the south central states in early to mid July. They are attracted to blooming sunflower fields, and females lay eggs on the surface of open sunflower heads. Newly hatched larvae feed on pollen and florets and then tunnel through immature seeds and heads. Silken threads produced by larvae bind frass and dying florets together, giving heads a trashy appearance. Severe larval infestations can cause 30-60% loss. Entire heads can be destroyed.

Begin scouting for sunflower moth at the late-bud stage (R-3 to R-4).

- ET—One to two adults per five plants at onset of bloom or within seven days of moths' first appearance.
- Control—Treat with a labeled insecticide at onset of bloom.

Banded Sunflower Moth

Adult moths are small (.25 inch), and buff to straw-colored, with a dark band across the forewings. Young larvae are off-white, changing to pinkish to red at maturity, 0.44 inch in length. Banded sunflower moths overwinter locally rather than migrating from the south. Adults emerge in about mid July, and females lay eggs on sunflower bracts. Larvae first feed in florets and then tunnel into developing seeds.

Monitor for sunflower banded moths from the late-bud (R-4) to early-bloom (R-5.1) stage. Scouting will be most accurate in the early morning or evening when moths are active. They tend to rest on undersides of leaves or in field margins during the day.

- ET—About one moth per two plants.
- Control—Deep fall plowing of sunflower stubble will reduce moth emergence. Delaying planting until late May or early June may reduce banded moth infestations. Several insecticides are labeled for banded sunflower moth control. Since adult moths tend to congregate in field margins just prior to sunflower bloom, it may be possible to confine chemical treatment to these areas.

Sunflower Midge

Significant sunflower midge, *Contarinia schulzi*, infestations were detected in several

north central South Dakota counties in 1998. Adults and larvae are very small (0.07-0.09 inch). Adults are gnat-like in appearance, while larvae are cream-colored and legless, tapering at both ends and lacking a head capsule. Midge adults begin to emerge in early to mid July. Females lay eggs on sunflower buds, preferring buds greater than 1 inch in diameter.

Larvae feed initially between the bracts surrounding the head and then migrate to the base of developing seeds and center of the head as the head develops. Necrotic areas at the base of or between the bracts often indicate larval feeding. Larvae secrete a substance that dissolves cell walls. Heavy larval infestations distort the growth of the sunflower head, producing knob- or fist-shaped heads with little or no seed.

- ET—None established.
- Control—No effective chemical controls are available. Some hybrids are more resistant to midge damage than others. Delaying planting until late May to early June will reduce damage in most years.

CONTROLLING BIRDS

Sunflower is vulnerable to damage by several bird species, but the greatest losses occur from migrating flocks of red-winged blackbirds, yellow-headed blackbirds, and common grackles. Fields located near cattail marshes are especially susceptible to bird damage. Blackbirds often roost in the cattail marshes at night and feed in nearby sunflower, small grain, or corn fields during the day. Before these crops mature and become vulnerable to damage, the blackbirds feed on insects and weed seeds. Once the birds become used to feeding in a particular area, it becomes more difficult to get them to move.

Blackbird control measures consist of cultural practices used in combination with frightening methods to move birds out of the areas where sunflower fields are located. Do not plant sunflowers near cattail marshes or woodlots. Leave blank rows or strips every 200 to 300 feet in large fields to provide access for scaring birds from the center of the field. Planting at the same time as neighbors

will reduce damage that often occurs to early- or late-ripening fields.

Some hybrids possess morphological traits that make them more bird resistant. These traits include concave heads, horizontally-oriented heads, and long head-to-stem distance. Hybrids possessing these traits must be planted in north-south rows to avoid overlapping of plants at maturity, which would offset some of their seed-protecting characteristics.

Weed seeds are an attractive food source for blackbirds. Good weed control will help prevent blackbirds from establishing a feeding pattern in weedy fields before the sunflower crop matures. Consider planting lure or trap crops on diverted acres in areas of high bird risk to keep birds out of susceptible crops. Harvesting sunflower as early as possible will reduce exposure to bird damage. Desiccants may be used after sunflowers reach physiological maturity to speed drydown and allow for earlier harvest.

Cattail marshes can be managed with an aquatic herbicide (Rodeo) to remove cattails used as roosting sites for blackbirds. Generally, the herbicide must be applied the year before sunflowers are planted in the vicinity of the marsh to allow time for the cattails to decompose.

Begin harassment of blackbird flocks as soon as birds are seen in the area, regardless of their diet. Various frightening methods are effective. Best results are often obtained by using a combination of harassment devices. Any device must be operated while the birds are in the field.

Automatic exploders or bird-scaring cannons detonate a gas to produce a loud explosion. Place these devices on a stand above the crop, and operate from just before sunrise until the birds head for their roosting sites at night. Move the exploder every few days, because the birds may become accustomed to the noise if the device is operated in the same place day after day. One exploder can generally protect 10-20 acres of sunflowers.

Use of a .22 rifle can often give good results in frightening blackbirds from sunflower fields. Use this method only with extreme care in areas where it is legal and safe. Fire the rifle from a high position into the midst

of settling birds, and then fire several more rounds into the lifting flock. One rifle can protect about 100 acres. In contrast, use of a shotgun is often ineffective because of the short noise range.

Electronic frightening devices are available that broadcast distress calls of blackbirds. They can be effective, but use is limited because of their high cost and limited broadcast range.

Pyrotechnic products are effective at frightening birds but can pose both personal and fire hazards. These products include fire-crackers, flares, whistlers, and cracker-shells. Wear safety glasses and hearing protection when using any of these products. Do not use during dry periods when fire risk is high.

HARVESTING

Sunflowers are usually ready for harvest in late September or early October or within 120 days after planting. Plants are physiologically mature when the backs of the heads turn from green to yellow and bracts are turning brown. Seed moisture at this stage is usually about 35-40%. A killing frost will facilitate crop drydown in most years. Desiccants (Gramoxone Extra or Sodium Chlorate) may be applied after physiological maturity to speed drydown. Take care not to apply desiccants too early, or loss of yield or oil content may occur.

Harvesting sunflower at moisture contents as high as 25% may reduce bird damage and seed shattering loss during harvest. Seed must then be dried to 9.5% moisture or less for storage.

Combines suitable for threshing small grains can be adapted to harvest sunflowers. A variety of header attachments are available. Most are designed to eliminate as much stalk from entering the combine as possible.

Optimum combine adjustments for sunflower will vary depending on the moisture of the seed and yield of the crop. Generally, combine forward speeds should not exceed three to five miles per hour. Set cylinder speed to give a cylinder bar travel speed of approximately 1725 feet per minute (300

RPM for a 22-inch diameter cylinder). Make initial concave settings as recommended in the operators manual, and then adjust according to crop conditions.

Sunflower seed is relatively light compared to other crops. Adjust the fan so there is only enough wind to keep the trash floating across the sieve. Adjust the chaffer and sieve to minimize the amount of material passing through the tailings elevator.

With a properly adjusted combine, threshed heads will come through only slightly broken and with only unfilled seeds remaining in the head. Settings can usually be adjusted to obtain less than 5% dockage.

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- SDSU/CES extension entomology website. www.abs.sdstate.edu/plantsci/ext/ent

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2000 copies printed by CES at a cost of 47¢ each. EC911. May 2000.