

## TILLAGE

Many tillage regimes are practiced in Canada including conventional, strip, ridge, minimum and zero-tillage. Many factors are to be considered when deciding what tillage regime to utilize, including soil type, climate, fertilizer regime and rotation. Different tillage regimes are associated with different impacts on crop production and the environment. For example, conventional tillage can be utilized to control specific crop pests, however it is also associated with erosion. Minimum- or zero-tillage can be implemented to manage erosion and preserve the soil profile. An understanding of the benefits and drawbacks of each tillage regime is important when deciding which to utilize.

## HARVESTING

### Timing

Sunflowers are usually the last crop to be harvested in the fall since fall frosts help in drying down the crop. The period between maturity and harvest should be kept as short as possible to minimize losses from bird damage and head-rot diseases.

### Desiccation

Chemical desiccation is used to quicken dry-down of sunflower heads. Desiccation is effective before a killing frost in enhancing head dry-down but should not be applied before the back of the sunflower head turns yellow and the bracts are brown and dry. The bract tips turn brown at 40-50% seed moisture which is still too high for desiccation. Proper timing is when most of the bracts have turned brown. At this stage the plant is physiologically mature and seed moisture will be 20 to 50 percent. Refer to the current Guide to Crop Protection for details on desiccation products.

### Combining

Sunflowers can be combined when the seed moisture is below 20 percent. Harvesting when seed moisture is greater than 20 percent can result in scuffing during harvesting and shrinkage during drying. It would be preferable to combine seeds at 10 to 13 percent moisture. Sunflowers can easily shatter if heads are very dry, and therefore combine speed must be slowed accordingly. Cylinder speeds range from 300-500 (rpm), with concave settings quite open (one inch in front and  $\frac{3}{4}$  inch in rear) to minimize seed breakage and dehulling. Using the slowest cylinder speeds with the largest opening will result in the least seed damage.

### Harvesting Attachments

Combines that are suitable for harvesting small grains will be adequate to harvest sunflowers. A proper header attachment is necessary to reduce shattering losses and harvest efficiency.

There are two types of attachments:

- ❶ The pan header which is mounted on traditional straight cut headers and is suitable for both row crop and solid seeding.
- ❷ The all crop header, which is only suitable for row crop planting.

### Storage

Sunflower seed is safe to store at a moisture content of 9.5 percent or less. At 10 to 12 percent moisture content, seed can be stored in bins with aeration. Any moisture content over 12 percent will require drying. Oil-type sunflowers can be dried with temperatures of 71-104°C (160-220°F) but confection types may scorch or wrinkle with these temperatures. Sunflower seed should be cooled before storage, since even sunflowers at 8.5 percent moisture can spoil if stored when warm.

## PEST MANAGEMENT

### INTEGRATED PEST MANAGEMENT

Integrated Pest Management (IPM) is a sustainable approach to managing pests by combining biological, cultural, physical and chemical tools to minimize economic, health, and environmental risks. A number of factors influence the abundance and diversity of pests from year to year. Control methods vary in effectiveness, but integration of different pest management tools can minimize pest numbers and the cost of management without unnecessary crop losses. IPM maximizes the effectiveness of chemical pesticides, while minimizing the impact on non-target organisms and the environment.

Scouting for potential pests, monitoring fields and keeping notes of pest incidences and densities is required to determine if levels are approaching the Economic Injury Level (EIL) or the Economic Threshold Level (ETL). Economic losses are a result of pest numbers increasing to where they cause crop losses greater than or equal to the cost of controlling the pest. The EIL is the number of pests at which tactics must be applied to prevent an increasing pest population from causing economic losses. The ETL is the level of pests that will cause economic damage and is often lower than the EIL. The ETL varies with crop price, yield potential, crop density, cost of control and environmental conditions. Pests should be identified accurately; control measures and economic injury levels differ between different organisms. Recognizing beneficial organisms is important as they help reduce numbers of damaging insects, which then may not require additional control.

Significant progress within sunflower pest management strategies have been made, and will continue to be made into the future. As new crop management strategies are developed, it is important to weigh crop production benefits versus environmental impacts.