



United States Department of Agriculture

# The **COST** of Soil Erosion

Wind erosion is becoming an increasing problem in Montana. Larger field sizes and inadequate residue have left our fields vulnerable to blowing winds.

This soil loss represents a significant expense and loss of sustainability to Montana farmers. In addition, it is a significant public health and safety risk.



**\$7,875 of fertility lost**

*This photo was taken in Liberty County in April 2022, after a wind erosion event. A soil sample from the top 6 inches of the blown-out soil in the ditch showed an available nutrient level of 34 lb N/ac, 26 lb P/ac, 700 lb K/ac, and 7 lb S/ac. At January 2023 fertilizer prices, this represents \$630/acre for every 6 inches of soil lost, or about \$105 for every inch of topsoil.*

*Assuming this farmer lost about ¼ inch of topsoil off this 300-acre field, they lost \$7,875 of fertility.*

## Soil Health Principles

Many of the solutions for solving the wind erosion problem are the same as the five principles for building soil health. The most important soil health principle to solve the wind erosion problem is to maximize soil cover and build surface armor. No-till alone cannot solve the problem of wind erosion and must be coupled with adequate residue and vegetation.



Maintain a minimum 60% flat surface residue cover.

- 1 Minimize disturbance
- 2 Maximize soil cover
- 3 Maximize diversity
- 4 Maximize living roots
- 5 Incorporate livestock

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MT 8/23

**“The cardinal rule of wind erosion control is to strive to keep the land covered with vegetation or crop residue at all times.”**

- NRCS National Agronomy Manual

## Causes and Cures of Wind Erosion

### Causes

- Lack of durable, high carbon residue
- Lack of growing vegetation and canopy cover
- Unsheltered distance and field size is too large
- Poor soil aggregation
- Smooth soil surface

### Cures

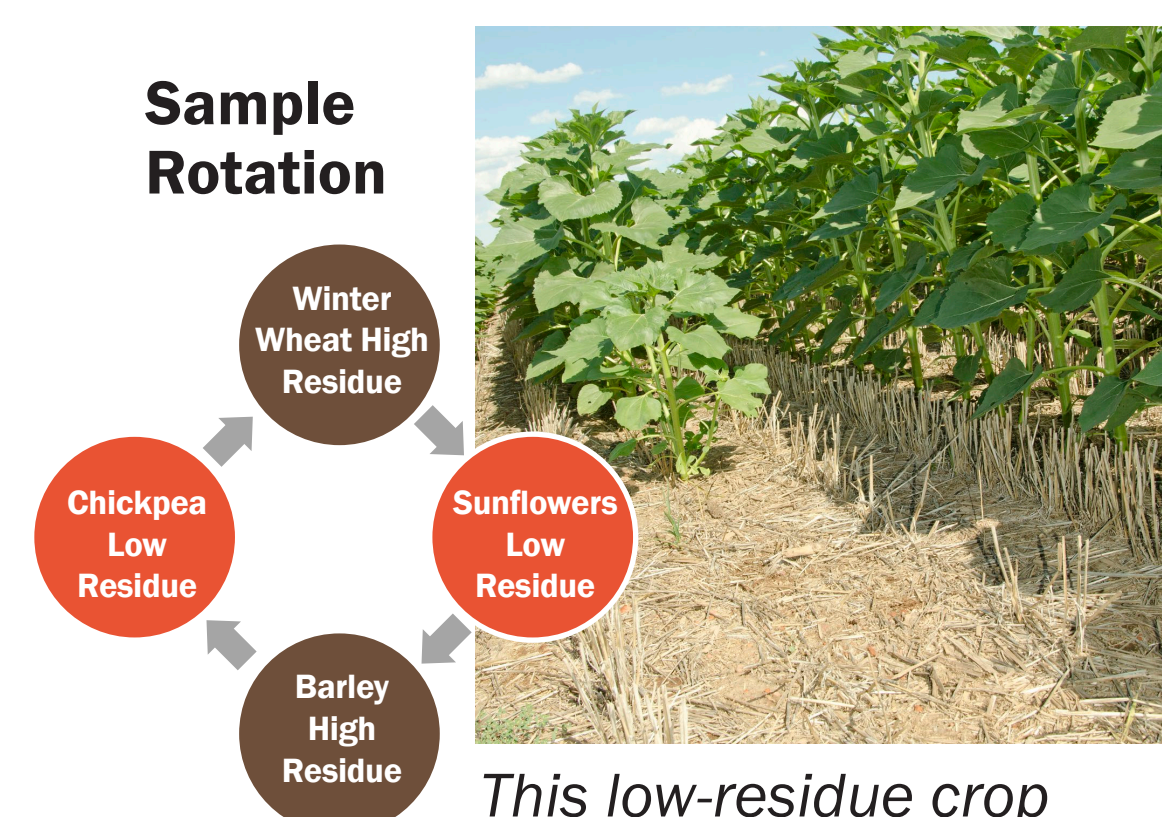
- 1 Increase amount and distribution of high carbon residue
- 2 Increase growing vegetation and canopy cover
- 3 Decrease unsheltered distance and field size
- 4 Increase soil aggregation by decreasing disturbance and increasing living roots
- 5 Increase surface roughness

## Consider: Crop Rotation

Crop rotation is the key to maintaining adequate residue and soil surface cover. NRCS Montana recommends:

- Include a minimum of 50% high-residue crops in the annual portion of the rotation. High carbon residue crops are grasses harvested for grain, such as wheat, barley, and grain corn.
- Always precede and follow a low residue crop and fallow with a high residue crop. Low residue crops include all broadleaves, such as peas, lentils, canola, and beets, and any grass crop harvested for forage, such as hay barley and corn silage.

### Sample Rotation



*This low-residue crop of sunflowers has good residue cover on the soil surface from the high-residue wheat crop that preceded it.*

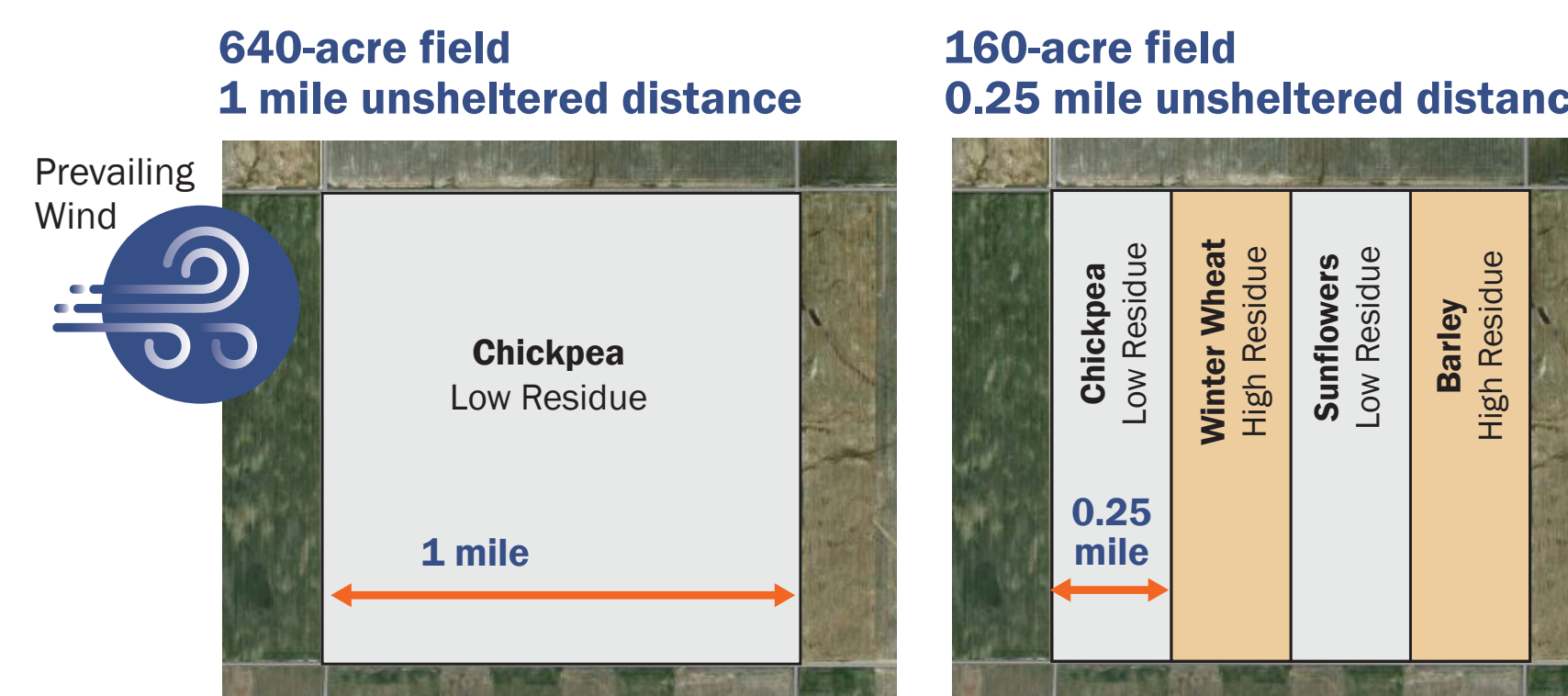
## Consider: Residue Management

Residue management starts at harvest.

- Distribute residues evenly across the field for erosion control and easier seeding of the next crop.
- Never burn residues.
- Never remove residue from a dryland field.
- Maintain a minimum of 60% flat surface residue cover.

## Consider: Field Size

Decrease unsheltered distance parallel to the prevailing winds.



If a farmer has done everything they can to maximize residue and vegetation on the field and they still have a wind erosion problem, they need a smaller field size and unsheltered distance.

As a rule of thumb, dryland no-till farmers should try to keep field sizes no larger than 160 to 320 acres, depending on soil type, crop rotation, and local wind speeds.

Dryland farmers in tilled systems, such as organic, should keep their fields in much smaller strips of 30 to 40 acres each.



**Pea field with about 10% flat residue** near Fort Benton, MT. With little residue and a large unsheltered distance, this field is highly susceptible to wind erosion.



**Field with tall standing stubble** near Billings, MT. Tall standing residue decreases wind energy and captures over-winter snow, making this field highly resistant to wind erosion. Maintain a minimum standing stubble height of 10 inches.

## For More Information

Watch the videos:



Learn more about what you can do to manage your land to prevent wind erosion by visiting your local NRCS field office. Find contact information at [nrcs.usda.gov/contact](https://nrcs.usda.gov/contact).

Soil and soil health information is also available on the NRCS Montana website at [nrcs.usda.gov/montana](https://nrcs.usda.gov/montana).

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