

## Impact of Winter Annual Weeds

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Winter annual weed pressure is increasing in many Nebraska fields. When Nebraska ag industry professionals were asked the question, “Winter annual weeds are: 1) A significant problem, 2) A minor problem, or 3) Not a problem,” at a recent extension meeting, 85% responded that winter annual weeds were “a significant problem.”

As agricultural management practices change pest pressures also change. Modern crop production is an artificial system conducted in a natural environment. The natural environment looks to exploit niches in any imposed system. When crop management strategies change, new niches are exposed. The natural system exploits the new niche(s), and new management challenges are introduced. Due to changes in our management systems, winter annual weed populations have become an issue of increasing importance in Nebraska row crop production.

Weed management specialists have identified the following factors as contributing reasons for the increased prevalence of winter annuals in corn and soybean fields.

- Increased adoption of no-till cropping systems (Figure 1). This shift in cultural practice represents a relatively subtle, but significant change in the cropping environment. When fall or spring seedbed preparation tillage is eliminated, it provides a positive environment for winter annual establishment. If nothing is done to control these weeds, the weed seed bank will increase, perpetuating the problem.
- Increase in total post-emergence herbicide programs for row crops. Many producers are utilizing earlier planting dates, seeking maximum yields, and feel that pre-emergence herbicide applications are not the most effective use of their time and resources. Many highly effective post-emergence products were introduced to the market place in the 80's and 90's and have made total post-applied herbicide programs desirable.
- As producers have adopted glyphosate and glufosinate tolerant crops, there has been a corresponding reduction in the use of herbicides with residual properties. While winter annuals were not the likely application target of the residual products, it is reasonable to assume that their populations were also reduced.
- Milder winters are expanding the environment where winter annual weeds thrive (more open falls and springs).

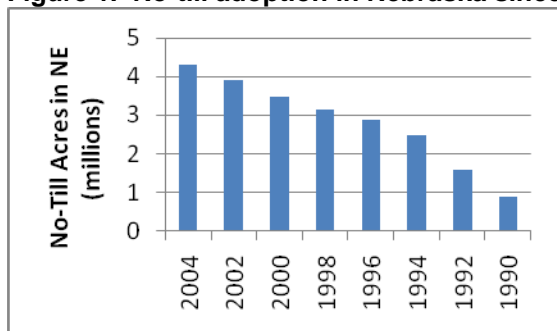
**Know how. Know now.**



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**Figure 1. No-till adoption in Nebraska since 1990**



### Impact on crop resources and inputs

Increases in crop production input costs necessitate the efficient use of water, fertilizers and pesticides to maintain producer profitability. If winter annual weeds are not controlled, they can consume water and nitrogen intended for crop utilization.

To estimate potential nitrogen immobilization by winter annual weeds, we might use the following assumptions:

- 500 lbs/ac of winter annual biomass growth at planting time (this would be a relatively dense, uniform stand of weeds).
- As a general statement, nitrogen composes approximately 3% of plant biomass.
- \$0.58/lb of nitrogen fertilizer (based on \$950/ton of anhydrous ammonia)

Based on these assumptions, a dense, uniform stand of winter annuals could tie up approximately 15 lbs of nitrogen per acre ( $500 \times 0.03$ ), or \$8.70 per acre ( $15 \times 0.58$ ) of nitrogen intended for a corn crop.

Conserving soil moisture is critical to profitability and yield potential in water limited environments. Similar calculations can be done to assign an economic penalty to water use by winter annual weeds. To estimate the irrigation cost to replace water used by the same 500 lbs/A of winter annual biomass, we will use the following assumptions:

- 500 lbs/A of winter annual weed biomass at planting time,
- 800 lbs of water is required to produce 1 lb of winter annual weed biomass.
- At \$2.50 diesel fuel, applying 1 inch of irrigation water per acre would cost \$9.66.

The 500 lbs of winter annual biomass would use 400,000 lbs of water per acre ( $500 \times 800$ ), or 47,920 gallons of water ( $400,000 \text{ lb} \times 0.1198 \text{ gal/lb}$ ). This equals 1.75 acre inches of soil water ( $47,920 \text{ gal} / \{27,158 \text{ gal/acre in}\}$ ) used by these weeds. Based on a cost of \$9.66 to apply 1 inch of irrigation water, it would cost approximately \$17.00 per acre to replenish the water used by winter annual weeds in this scenario.

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It is important to realize that these are dynamic relationships. As input and production costs change, so will these estimates; however it does illustrate the potential costs of allowing winter annual weed to grow in a water limited environment, and provides a decent justification for the cost to control these weeds.

## Other Issues

Winter annuals have been documented as alternative hosts for a number of insect and nematode pests of corn and soybeans. As producers are educated on the yield impact of these relatively new insect and nematode pests, they are seeking management options to help control them. Work from Purdue University has demonstrated that soybean cyst nematodes can survive on a number of winter annual species, including common chickweed, henbit, and shepherdspurse. Detailed information can be found at the following website, <http://www.btny.purdue.edu/weedscience/SCN/index.html> . Winter annuals also provide a favorable environment for a number of corn insect pests, including cutworms, which feed on newly emerging plants.

Proper planting depth and uniformity is important. Planting into dense stands of winter annual weeds may cause problems with uniform seeding depth and improper seed furrow closure. Dense winter annual stands can also keep soils cool and wet, also leading to less uniformity in crop emergence and development.

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