

## Background



Figure 1. Tractor with a sprayer that is equipped with the WEED-IT system from WEED-IT, WEED-IT Quattro, WEED-IT, 27 August 2019, youtube.com/watch?v=ToiGzgJBYN0.



Figure 2. Russian thistle weed (green) in fallow wheat field (yellow) from Barroso, Juddit et al., *Russian Thistle: Management in a Wheat-Fallow Crop Rotation*, OSU Extension August 2019, catalog.extension.oregonstate.edu/prnw492/html

## Vocabulary

**fallow (fallow rotation):** the period of time when nothing is grown on a field; it is empty.

**tilling:** breaking up and turning over soil to remove leftover plant matter and weeds and prepare it for planting seeds.

**herbicides:** chemicals used to kill unwanted plants.

**resistant:** is not affected, or can withstand something; weeds that are resistant to herbicides will not die when sprayed.

**natural resources:** things in nature (water, soil, air, fossil fuels) people can use.

Managing weeds on **fallow** fields is a challenge in farming. Often, farmers turn to a combination of chemical and physical controls to take care of weeds on their field.

**Tilling**, or turning over soil manually, removes any weeds but also makes soil susceptible to erosion.

**Herbicides**, like Round-Up and other chemical sprays, are also an effective method of weed control. However, spraying the entire field can be expensive and broad application has contributed to herbicide-**resistant** weeds.

The WEED-IT system uses special machines and nozzles that mount on existing herbicide sprayers. The WEED-IT sensors detect chlorophyll (green color pigment) on the field - i.e. weeds. A nozzle sprays herbicide only on the precise spots where weeds are detected, resulting in a precision application. So, **What challenges can the WEED-IT technology solve for Washington farms and their neighbors?**

Read your article at least two times. Follow the instructions below for each time you read.

### 1. MARK THE TEXT

Underline claims the author makes. A claim is the idea (or ideas) the author will show you or try to convince you of.

Circle the vocabulary words listed in the box above if you find them in the text.

### 2. CONNECT AND RESPOND

Use these symbols to mark sentences or paragraphs in the article. Explain your connections or responses in the **margin**. Include at least two of the following:

→ Something you have a connection to (Do you know something else about the point the author is making? Did you learn this information in another place?)

† Something you agree with

× Something you disagree with or have a counterclaim for

Essential Question: What challenges can the WEED-IT technology solve for Washington farms and their neighbors?

- TARGET ACQUIRED: Benton County farmers, conservation district team up on precision application project** *Wheat Life Magazine* June 2019 by Trista Crossley
- 1 In the ongoing fight against weeds, one Benton County wheat farming family feels like they’ve hit the spot by employing a precision technology that saves them 80 to 90 percent on their chemical costs.
- 2 “To me, this is the next best thing after autosteer for a return on investment,” said Devin Moon.
- 3 Moon and his brother, Garrett, saw a demonstration of the WEED-IT technology last year and were impressed enough that they approached the Benton Conservation District (BCD) with a proposal for a pilot project to test the system in a no-till fallow rotation.
- 4 The WEED-IT system works by detecting small amounts of chlorophyll and precisely applying chemical to just that spot. According to their website, the WEED-IT technology was invented in Holland in 2001 as a way to avoid applying a “blanket” of chemicals over roads and footpaths to kill weeds.
- 5 In 2009, the technology was modified for use in agriculture with the first system sold in Australia that same year. The Moons purchased the system, which mounts on their existing sprayer, and the conservation district provided some financial assistance for the actual work, i.e. labor, fuel and chemicals.
- 6 Melissa Pierce, resource conservationist with the BCD, said the project appealed to the conservation district because many farmers in the Horse Heaven Hills are converting to no-till fallow rotations, which means tillage is not an option for weed control.
- 7 The Moons were targeting Russian thistle, prickly lettuce and horseweed with the system.
- 8 “With not using tillage anymore, farmers need to use chemicals to control weeds, and they are starting to notice some chemical resistance,” she explained. While farmers see the savings in chemical costs, the BCD sees potential savings in other areas.
- 9 “From a conservation district or natural resources point of view, using less chemicals means less impact on natural resources. Another benefit to natural resources is just being able to make no-till fallow rotations a more sustainable practice.”

A conservation district is a local agency that helps farmers, landowners, and others take actions that improve the quality of the water, land and air.

- 10 Broad application of herbicide can lead to the chemicals mixing with the air (volatilization) and even the chemicals moving to nearby land and water (drift). Some of the benefits that the BCD expects to see from precision technology like WEED-IT are less volatilization of the chemicals and less potential for herbicide drift. Less tillage also means fewer impacts on air quality and soil erosion.
- 11 The Moons had previously used weed-seeker technology, but were unimpressed. Devin said he was initially wary of the WEED-IT technology until he saw it demonstrated.
- 12 “It was an ‘ah ha moment’ watching this thing spray dime-sized weeds in stubble,” he said. “It was impressive. Weeds are tougher now to kill chemically than even five years ago, and it’s only going to get increasingly hard. This made a lot of sense.”
- 13 Before he saw it working, Moon said he was skeptical of saving enough money on chemical costs to make WEED-IT a sound investment. He explained that it’s easy to overestimate how weedy a field really is when spraying with a traditional sprayer.
- 14 “You’d think it is covered with weeds, but it’s really only 20 to 30 percent. I had a field lousy with Russian thistle. I took WEED-IT through it and still saved 70 percent on chemicals,” he explained. “It’s just worked better than anticipated.”
- 15 Because of the cost savings, Moon anticipates being able to use different herbicide modes of action that he otherwise might not be able to afford, which will help with weed resistance. Another benefit is that the system can detect weeds when they are very small and easier to kill, helping combat weed resistance. Killing the weeds before they grow also helps keep more moisture in the ground.
- 16 The BCD sees benefits too. “Less herbicides...that’s a great thing for the conservation district to get behind. If they [BCD] are going to pony up money and have to defend to the public why they are supporting something, who’s going to complain that we are using less chemicals?”

Adapted from Crossley, Trista. "Target Acquired: Benton County farmers, conservation district team up on precision application project." *Wheat Life*, June 2020, [wheatlife.org/t\\_0619\\_WEED-IT.html](http://wheatlife.org/t_0619_WEED-IT.html). Accessed 01 August 2021.

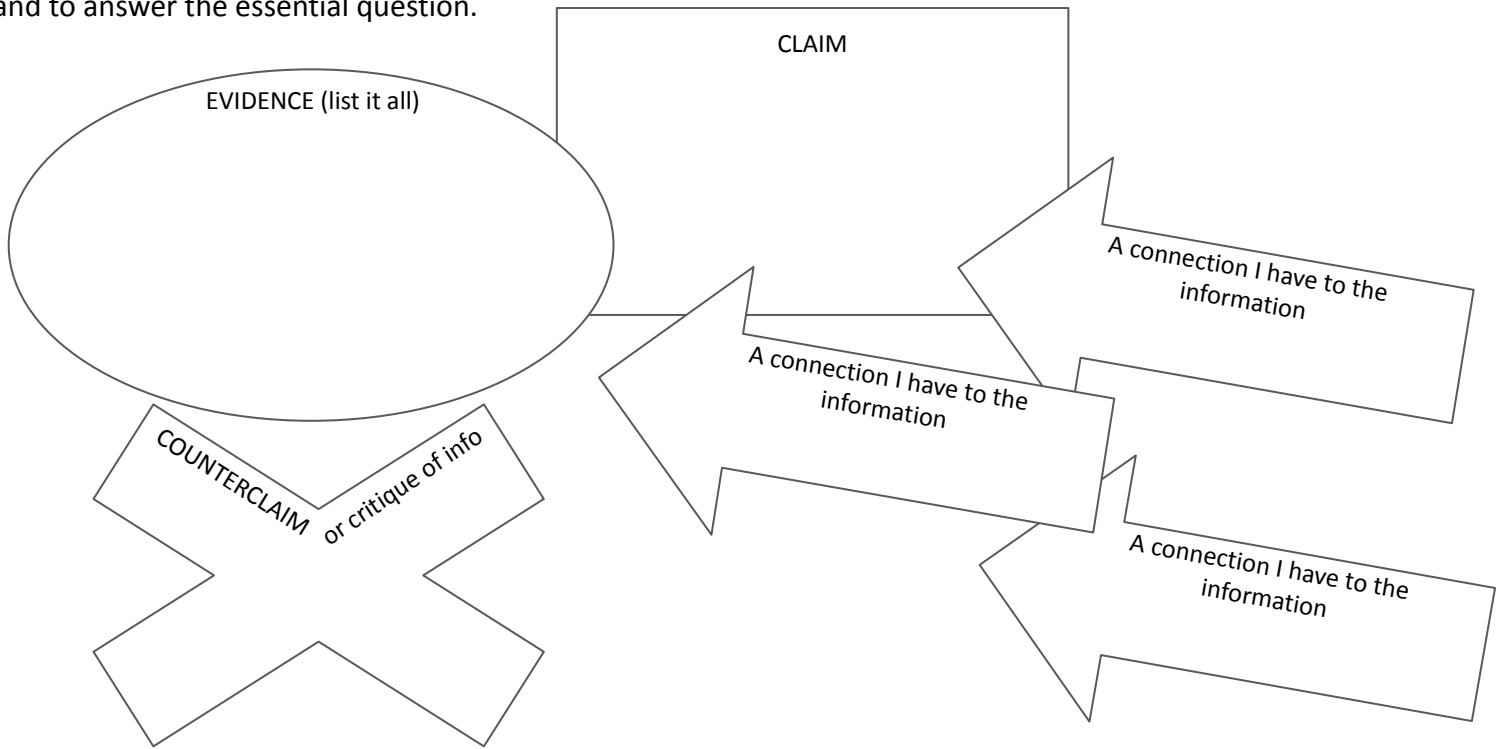
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**Summary:** Review the essential question and your annotations. Answer at least two of the following questions in the space below. What claim(s) does the author make about the essential question? Do you agree with the claims? Are they well supported by evidence from the article? What connections did you make that help you evaluate the author’s claim?

NAME: \_\_\_\_\_ PRD: \_\_\_\_\_

Essential Question: What challenges can the WEED-IT technology solve for Washington farms and their neighbors?

**Discussion** Use your annotations on your article and fill in the shapes to help you prepare for the discussion and to answer the essential question.



During the discussion, use the sentence frames below to get you started.

### Near the beginning

Give (and analyze) claims and evidence

My article says...but I think...

My article says...and I think...

### In the middle

Evaluate information and look for connections and/or counterclaims

From what I know...because...

A counterclaim would be that...

Does anyone have more information about...

### Near the end

Answer the essential question

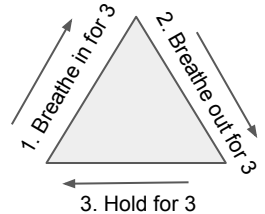
When you said...I thought...

Does the group agree that...?

After listening to everyone's thoughts, I think...

Nervous about speaking? It's normal.  
Here are some things that might help:

Breathe. Use a triangle breath to regulate your nerves and prepare yourself to speak.



Go back to your article and look for where you noted **personal connections** to the text. Speaking about something you have experience with may be easier in the group discussion.

Look at the sentence starters to the left. Write out what you are going to say by filling in the blanks and be on the lookout for when to add your thoughts.

Essential Question: What challenges can the WEED-IT technology solve for Washington farms and their neighbors?

**Reflection** Think about what you read and what others said in the group discussion to answer the following questions.

1. Rate your participation during the discussion by checking the ways you participated below:

→ Shared information by stating (at least 1)

- ☐ **My article's claim, quoted directly from article**
- ☐ My analysis of the claim
- ☐ **Relevant connection or background information**
- ☐ Evidence, quotes directly from article

→ Responded to others ideas by (at least 1)

- ☐ Pointing out a counterclaim
- ☐ Asking for examples
- ☐ Asking for evidence
- ☐ **Saying more about others' ideas**
- ☐ Prompting someone else to respond

→ Showed respect for others' ideas by (at least 1)

- ☐ **Paying attention to people who are talking**
- ☐ Staying on-topic
- ☐ Re-engaging the group after a period of silence or if you go off-topic
- ☐ Monitoring time

→ Answered the essential question by (at least 2)

- ☐ **Saying my ideas about the essential question**
- ☐ **Using evidence to back up my ideas**
- ☐ Providing a different answer or idea
- ☐ Giving OR asking for a summary

2. What did you get out of this activity?

- |                     |                                |                                   |                                     |
|---------------------|--------------------------------|-----------------------------------|-------------------------------------|
| I learned           | <input type="checkbox"/> a lot | <input type="checkbox"/> a little | <input type="checkbox"/> nothing    |
| I participated      | <input type="checkbox"/> a lot | <input type="checkbox"/> a little | <input type="checkbox"/> not at all |
| My thinking changed | <input type="checkbox"/> a lot | <input type="checkbox"/> a little | <input type="checkbox"/> not at all |
| I enjoyed it        | <input type="checkbox"/> a lot | <input type="checkbox"/> a little | <input type="checkbox"/> not at all |

3. How would you answer the essential question in 2-3 sentences? Consider the claims and evidence from your article, along with connections, background information, and counterclaims and evidence brought up during the discussion. Use the graphic organizer on the previous page to help you with your writing.