Identification of Russian thistle glyphosate resistant in Northeastern Oregon

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Russian thistle (*Salsola tragus*, but also known as *Salsola iberica, Salsola kali,* or *Salsola australis*) is a severe problem in the low rainfall, non-irrigated, small-grain producing regions in the Pacific Northwest (PNW). It is often the predominant broadleaf weed where the wheat summer fallow is the predominant cropping system. In the PNW, it infests nearly 5 million acres and costs farmers more than $50 million annually in control measures.

The control of Russian thistle postharvest and in the summer fallow is critical to avoid the production of large quantities of seed. The 26 gal/plant of soil moisture removed from the soil can prohibit crop production in the following year. In the early 1980s, the registration of sulfonylurea herbicides provided a great advancement in Russian thistle control. However, the repeated use of these herbicides selected for sulfonylurea herbicide-resistant Russian thistle populations in several states of the Western US (Montana, Idaho, Washington, California, and Oregon) in late 1980s and since then, this species has evolved extensive resistance to this group of herbicides.

Today, glyphosate is the first herbicide choice for growers in the PNW to control Russian thistle after harvest and during summer fallow. However, over reliance on this chemical has already led to the occurrence of herbicide resistant weeds. For example, glyphosate-resistant Italian ryegrass is now common in Oregon and resistant Kochia has been documented as well.

Why Does This Matter?

- **Russian thistle is a major weed problem in PNW wheat areas**
- **Glyphosate resistant Russian thistle populations have been confirmed**
- **Research on extent of resistance and control options continues**

In fall 2015, complaints from farmers about lack of Russian thistle control with glyphosate prompted me (Weed Scientist at Columbia Basin Agricultural Research Center (CBARC) – OSU) to test whether there were glyphosate-resistant Russian thistle populations in Northeastern Oregon.

In February 2016, on fallow fields of Umatilla, Morrow, and Sherman Counties, Larry Lutcher (Extension Faculty of OSU) and my technician Jennifer Gourlie helped me to collect twelve populations (Figure 1 and 2). Each population consisted of at least ten Russian thistle plants randomly gathered and labelled for later processing.

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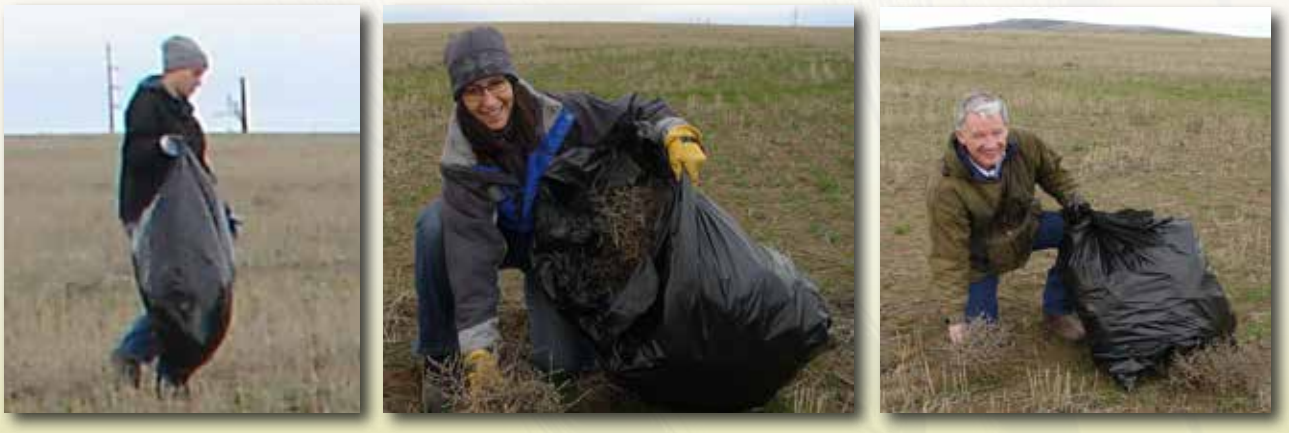

Figure 1: Collecting Russian thistle populations in fallow fields of Morrow County

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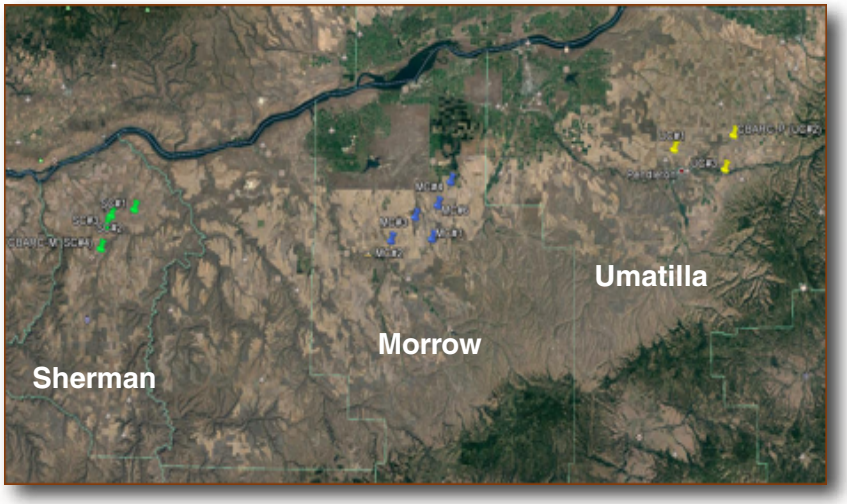

Figure 2: Location in Sherman, Morrow, and Umatilla Counties of the collected populations

To speed things up, half of the populations were sent to campus to be handled by my colleague Dr. Carol Mallory Smith. The protocols were set the same in both greenhouses (CBARC and campus). At seedling state (5 - 6 leaves stage), the populations were treated with 0X, 0.25X, 0.5X, 1X, 2X, 4X, and 8X, being X the recommended dose of Gly Star original®. Following label recommendations, we used 24 oz/ac because the seedlings were shorter than 6 in. Six pots with four plants of Russian thistle each were sprayed (16 gal/ac) per treatment and population. The 42 pots per population (seven treatments x six pots per treatment) were evaluated three weeks after treatment by counting live plants and taking the biomass per pot.

We found that three of the collected populations in Morrow County survived the 4X (96 oz/ac) and that a few plants of those populations survived the 8X (192 oz/ac) (Figure 3 and 4). Consequently, the presence of Russian thistle glyphosate-resistant populations has been confirmed in Morrow County.

Figure 3: Photos of the seven treatments 0X (white label), 0.25X (yellow label), 0.5X (blue label), 1X (green label), 2X (pink label), 4X (orange label), and 8X (red label) sprayed on a) a susceptible population of Umatilla County and b) a resistant population of Morrow County.

Russian thistle plants have a high potential to move with the wind direction due to the brittle stem at maturity and spread the seeds large distances, which may allow the resistance to spread very quickly. It is important that sprayed fields are monitored for plants that survive glyphosate applications, and surviving plants removed by tillage or spot spraying.

I will initiate other investigations to study the state of the resistance in Oregon by collecting a higher number of populations in addition to those from Morrow County, and also to study alternatives to glyphosate to control Russian thistle for management recommendations. Please contact me (541 278 4394 – Judit.Barroso@oregonstate.edu) or my technician (541 278 4353 – Jennifer.Gourlie@oregonstate.edu) if you suspect glyphosate resistant Russian thistle on your farm.

Figure 4: Random distribution of the 42 pots of: a) the susceptible population showed in Figure 3a and b) the resistant population showed in Figure 3b.