

Implement a proven weed management plan for kochia

Many of Wyoming's most problematic weeds, including leafy spurge and field bindweed, defy control because they are perennial and easily spread through both seed and root segments.

Kochia, on the other hand, is an annual broadleaf plant that does *not* reproduce by vegetative root segments, only by seed. Kochia, Palmer amaranth, and other competitive annuals use nutrients and sunlight more efficiently than crops and can significantly reduce crop yields and outcompete other desirable vegetation.

Luckily, although prolific, kochia can be controlled with chemicals or physically controlled by methods such as hand pulling. Simply removing above-ground biomass (before the plants go to seed), is usually effective.

Kochia can be controlled by several types of herbicides, including glyphosate, an active ingredient in many Roundup® products.

Herbicide resistance

Unfortunately, annual weeds' ability to produce multiple generations of plants within a

single year and their propensity for prolific seed production (up to 20,000 seeds per plant), can lead to herbicide resistance.

When weeds like kochia develop resistance to a particular type of herbicide, the herbicide becomes ineffective.

Once herbicide-resistant plants appear, they reproduce and can spread quickly across a landscape. Glyphosate resistance is becoming common in kochia.

There are multiple reasons for kochia's persistence following control measures. First, herbicide resistance is common at the genetic level in kochia. In this case, glyphosate-resistant plants create more of the EPSPS enzyme, which interferes with glyphosate's effectiveness when applied at labeled rates. When sprayed, only plants with the ability to make extra EPSPS enzymes survive. The survivors then pass on this resistance very efficiently due to their prolific reproduction.

Even if only 0.1 percent of a treated weed species survives a control treatment

(herbicides or other methods), the chances are favorable that some of these plants may have physical or genetic traits that resist the management strategy.

Weeds can also become resistant to other methods of control, not just herbicide treatments. For example, seeds that germinate later than the rest of their kind may escape tillage, which occurs at the same time each year. Thus, managers are highly encouraged to utilize multiple weed control methods.

Detecting resistance

Thanks to kochia's excellent tumbling ability, one of the first ways to spot herbicide resistance is to find a linear patch of weeds in



Kochia tumbled a path through this onion field.

M.E. Bartolo, Bugwood.org

Redeeming qualities?

Depending on where kochia is growing, it may not be considered a deleterious plant. In a farmstead, rangeland, or waste area, the plant does serve a purpose. It has a fibrous root system that can hold soil, has decent forage quality, and can provide cover for many animals and birds. It even saved many farmers as one of the only viable grazing options during the Dust Bowl. However, kochia is not native to the U.S. (it originates in Eurasia).

a known treated area. As resistant kochia plants tumble across the field, they shed seed. These seeds sprout and, later that season or next year, a healthy line of kochia plants will be readily visible in the treated area when the crop is dry.

Because kochia plants often tumble until they hit an

impediment, such as fencerows, tree lines, and even other plants, resistant kochia plants can also often be found around these objects.

A comprehensive approach

An ideal weed management plan controls all the kochia on the entire property. If multiple years of kochia control can be achieved, it is possible to break the cycle of yearly chemical sprays on whole field crops and vastly reduce the chances of herbicide resistance.

To the landowner's advantage, kochia has very low seed longevity relative to other weeds. It only lives up to two years, with many seeds not surviving the first winter. A few years of excellent control may be all that is needed to crash a kochia population on your property.

Kochia patrol

Care must be taken to control all of the kochia around the property to keep the seeds from entering a field. This may include cleaning equipment storage areas, stack yards, and fence lines. Kochia control encompasses not only the crop but also roadsides and waste areas.

Construct and clean out physical barriers that catch blowing kochia plants such as fence lines and taller vegetation where appropriate. Make sure there are no surviving weeds in chemically controlled areas.

If appropriate for the site, burning is also an option.

Work with your neighbors

Plants tend to not respect land ownership boundaries. Kochia is a prolific tumbler and doesn't stop until impeded by a physical barrier, dropping seeds along the way.

Prevention of the influx of kochia seeds is a must, and the task is much easier when folks implement control measures in cooperation with their neighbors. Educate your neighbors about the difficulties that this otherwise benign annual plant poses for certain cropping systems and work together to prevent its spread.

Physical barriers help prevent tumbler seeds from entering a field. Intentionally planting taller plant species (bio fences) on field borders or corners can snag a rolling kochia where it can be



Senescent kochia plants are one species that adapted to form tumbleweeds. Many people are familiar with the plant when it dries out and tumbles, spreading seed the whole way.

destroyed or its seedlings easily controlled the next year.

Chemical control considerations

Always consult the herbicide label for limitations, timing, and rate.

To prevent resistance from forming in populations, producers may rotate the crop to a more competitive one. To control kochia, this would likely be corn, wheat, or barley. Typically there are more options to treat broadleaf weeds in a grain crop rather than broadleaf weeds in a broadleaf crop.

Make reasonable crop rotations that take into account what direction kochia seed is entering the field and do not plant chemical-limited crops downwind from kochia infestations. A buffer crop may be needed on the fence line adjacent to a kochia infestation.

Landowners downwind of an uncontrolled infestation may want to avoid rotating to crops with limited herbicide options. Note that chemical control options may be less limited outside of a row crop situation.

A proven plan

Evidence for the effectiveness of coordinated control approaches can be found in Australia, where in the 1990s widespread infestations of kochia were not only controlled, but eradicated. Authorities in western Australia were able to accurately locate infestations, encourage producers to participate in complete control of kochia, and run the soil seed bank out of viable weed seeds.

For much of the Intermountain West, eradication is a lofty and unrealistic goal. However, drastic reduction in population density

of kochia is a more practical and obtainable goal. Furthermore, since evidence shows kochia can be controlled in this way, such methods are likely to be effective for other troublesome annual weeds.

If you are struggling with a kochia infestation, seek assistance from your local extension or weed and pest district office. These professionals can help determine which chemical and physical control methods are appropriate and most efficient for your property.

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As interim supervisor for the Natrona County Weed and Pest District, **Matt Jolivet** is on the frontlines of Wyoming's war on kochia. He can be reached at (307) 472-5559 or ncwp.jolivet@gmail.com.



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Kochia growing alongside a road near a field of corn.