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FUGITIVE OF THE WEEK

NAME: **Kochia**

No. **249**

Last known whereabouts: Predominate sightings have been made south of HWY#1 but reports are increasing north of the highway into darker soil. Can be found during drought conditions and occasionally appear in Western movies for fun.

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COVER: CANOLA COUNCIL OF CANADA | CURRENT PAGE: SASKATCHEWAN PULSE GROWERS

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STAYING AHEAD OF KOCHIA: STRATEGIES AND SOLUTIONS

Kochia remains a tough challenge for growers across the Prairies, with southern Manitoba, Saskatchewan, and Alberta feeling the most impact. Additionally, this persistent weed continues its advance north in the western provinces.

What makes kochia so challenging? Its early start in spring, rapid growth, and impressive seed production means it's often the first weed to take hold in your fields.

Kochia is even tougher than it looks. It can handle frost and quickly spreads into dense mats, especially in spots where last season's seeds have taken root.

The effects of uncontrolled infestations can be severe. Farmers in Alberta have reported yield losses of over 90% in some crops. Research from Dr. Lyle Friesen at the University of Manitoba highlights wheat yield losses in Saskatchewan of up to 73 per cent at high kochia densities (195 plants/m^2). Even lower densities of just 21 plants/m^2 can cause yield reductions of around 33 per cent.

The challenge continues. Kochia is becoming increasingly resistant to several herbicide groups, including Groups 2, 4, 9, and 14. Effectively managing this weed means using a well-rounded approach that combines cultural practices, mechanical tools, and strategic herbicide use.

This guide is here to help. Inside, you'll find practical tips and proven strategies to outsmart kochia and keep your fields thriving—this season and beyond. FMC

CONTENTS

Articles written by Paige Fehr, BSc.Agr., MSc., AAg for FMC Canada

SCOUTING FOR KOCHIA:
BEST PRACTICES FOR EARLY DETECTION

Kochia has rapidly become one of the most pervasive and troublesome weeds that producers must contend with in Western Canada. It is a hardy, summer annual broadleaf weed that produces seeds prolifically and spreads vast distances via tumbleweeds. Kochia thrives in a wide range of growing conditions, including droughty and saline soils. Herbicide resistance in kochia has also become a serious challenge in recent years, making it an even greater threat to Canadian growers.

As populations continue to explode, kochia costs farmers an increasing amount of time, money, and frustration each year. As such, growers must be armed with up-to-date knowledge on how best to manage the weed and limit its spread on their operations. Getting boots-on-the-ground in early spring, understanding exactly what to look for, and having a plan of attack lined up are crucial steps in the early detection and control of kochia.

SCOUT EARLY

The key to managing kochia is to **do it early!** According to the University of Nebraska - Lincoln, kochia can germinate in soils as cool as 3°C or 4°C. This means that - depending on the weather and management practices - we could see kochia popping up as early as April in the prairies.

Since most cash crops aren't seeded until the soil temperature reaches closer to 8°C or 10°C, kochia seedlings have the potential to gain a considerable head start on the growing season. This gap between potential kochia germination and prime seeding conditions represents a critical period for weed management.

As such, scouting for kochia should occur early and often, especially in areas where kochia was problematic the year prior. While kochia seeds do not typically survive in the seedbank beyond a couple of years, the plants are prolific and places that were overrun with kochia last summer will have a hefty seed bank from which to propagate next season's weed crop. Growers should also take care to check along fence lines, field edges, or shelterbelts where last season's tumbleweeds may have congregated and dispersed seed.

When scouting, it is important to document the specific locations, growth stages, and severity of weed infestations observed. Pictures are worth a thousand words when it comes to scouting. There are several apps available to growers to help keep scouting notes and photos organized and accessible.

Overall, frequent, thorough, and early scouting will give growers the best opportunity to manage their kochia issues.

KNOW WHAT YOU'RE LOOKING FOR

Getting boots-on-the-ground as soon as the soils begin to warm in the springtime is the first step for early detection of kochia. Next, growers must familiarize themselves with the appearance and growing patterns of the plant so they know exactly what to look for.

Kochia is an early germinator, mainly popping up in the early springtime with additional flushes throughout the season. Kochia seedlings grow in basal rosettes, otherwise known as "buttons." The leaves are pale green, club shaped, and densely haired. Seedlings have pink or red leaf undersides in the very early stages. As the plant

TOP LEFT: BIB-BILDER - ADOBE STOCK | TOP RIGHT: ONTARIO MINISTRY OF AGRICULTURE, FOOD AND AGRIBUSINESS

matures, leaves become oblong and tapered at the ends and maintain their dense leaf hairs. Mature plants are branched and bush-like, with reddish stems.

In places where kochia grew the season prior or where tumbleweeds have settled, kochia seedlings can be found growing in a dense mat that will pose a challenge when it comes to cropping the area. Kochia can be an aggressive competitor against other plants, especially when it gets a head start. Knowing where and what to look for is a vital step in kochia control.

HAVE A PLAN AND TAKE ACTION

If growers find kochia in their fields during spring scouting, it is wise to implement an action plan in a timely manner. Integrated weed management practices that include cultural, mechanical, and chemical controls offer the greatest opportunity for weed control whilst mitigating some of the risks that lead to increased chemical resistance.

CULTURAL

Cultural controls against kochia include seeding early so as to limit the head start that kochia has against the cash crop. Seeding crops like winter wheat or fall rye offers an even more effective means of outcompeting kochia, since these crops pop up early in the spring.

MECHANICAL

While tillage can have detrimental effects on soil structure and lead to issues with wind and water erosion, shallow tillage is a mechanical control option that can effectively disturb early-stage kochia. Spot-tilling in areas of high kochia seedling density can reduce overall weed pressure later on.

CHEMICAL

The key to chemical control of kochia is early herbicide application - herbicide efficacy on more mature kochia plants is greatly reduced compared to when applied to small seedlings. Since kochia is an early germinator, it typically reaches a more advanced growth stage than other common broadleaf weeds by the time they are ready to be sprayed. To achieve the best weed control, producers should choose pre-seed herbicide products that have wide application windows and ensure good spray coverage. Herbicide resistance in kochia is a growing concern, so chemical controls must be used responsibly.

In brief, growers might prepare for springtime kochia control now by curating a management plan early, before it is urgently needed. Over these winter months, growers can plan for springtime scouting, get comfortable with their weed identification, and consider which control options best fit into their farm management plans. FMC

TOP: BREANNE TIDEMANN, AAFC

The first iterations of impact mills were separate pieces of equipment pulled behind the combine. These days, the technology is more compact and streamlined.

HARVEST WEED SEED CONTROL:
A NEW FRONTIER IN KOCHIA MANAGEMENT

Harvest weed seed control (HWSC) represents a series of cutting edge innovations in non-herbicide mechanical weed management. These technologies have gained significant interest in the last several years in response to growing concerns around the spread and persistence of herbicide resistant weeds, including kochia.

HWSC technologies aim to mitigate weed populations by targeting and destroying weed seeds during harvest. In this way, the number of weed seeds in the soil's seed bank is gradually reduced and weed populations decrease. Impact mills, also known as seed destructors, are arguably the most well-known form of HWSC.

The original impact mills were pull-type machines that followed behind the combine during harvest. While effective, these pull-types added more weight, bulk, and fuel costs to the combine setup. Newer impact mills available today are equally as effective and are mounted directly onto the backs of combines, streamlining the whole operation.

HOW DO IMPACT MILLS WORK?

The basic premise of all seed destructors is to damage weed seeds through impact. During harvest, they collect smaller debris coming out of the chaff stream of the combine. This includes weed seeds. The mills in the seed destructor unit spin rapidly, hitting or crushing the seeds as they pass through the system. The idea is that the seeds become non-viable due to the impact, hence the technical name impact mill.

IMPACT MILLS AND KOCHIA

According to Dr. Breanne Tidemann, research scientist and weed control specialist with Agriculture and Agri-Food Canada in Lacombe, AB, impact mills can be >95% effective in destroying the seeds that enter the mill, and >97% effective in destroying kochia specifically. Tidemann explains that the challenge, however, is that not all weed seeds make it into the

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Redekop Manufacturing's Seed Control Unit (SCU) is one of a few impact mills currently on the market, and the only big name in Canada.

mill. This is where we get reduced efficacy issues.

Tidemann explains "...kochia is often not fully mature at cereal or canola harvest timings, and certainly not at pulse harvest. This means there is a substantial amount of green vegetation and leaves still on the plant. Green, wet material does not flow as efficiently as dry material."

This tough plant material does not break down fine enough to exit through the chaff stream where it would be captured by the impact mill, but rather much of it exits the combine as bulkier material in the straw stream. There, it is deposited back onto the field as viable weed seeds. To improve weed seed capture for challenging species like kochia, growers can try swathing or desiccating the crop prior to harvest, or leaving heavy kochia patches alone and returning when they've dried down.

A 2024 survey by Tidemann and colleagues Drs. Charles Geddes and Shaun Sharpe revealed that 50% of impact mill early-adopters named kochia control as a main driver for impact mill adoption. The same respondents also reported kochia as being one of the most responsive weed species to impact mill use, but that the primary concern of the early-adopter was still the ability of the mills to deal with green plant material. This being said, the technology is relatively new and is continuously improving. Over the next several years, additional research and best practices are expected to be established.

TRENDS IN IMPACT MILL ADOPTION

HWSC implementation is growing in prairie Canada and across the globe. Dr. Tidemann estimates that there are 30-35 impact mills in operation on the Canadian prairies presently, with that number on the rise. Tidemann also notes a significant increase in attention surrounding the technology in recent months, with a notable uptick in farmers and commodity groups showing interest and asking questions.

Tidemann explains "Those that have used it the longest are certainly feeling they are getting value from it from the survey work we've done. I'd say there is some skepticism, particularly related to the price tag. These are not tools that will show an impact immediately the next year because there is a seedbank that needs to be 'drained', if you will, before you start seeing effects on weed populations. But I'd say there is interest and in my opinion a little bit of a "let's see how it works for the neighbours" attitude happening."

Impact mills work well for weed control in cereals, pulses, and canola, but are not suitable for crops like corn or potatoes due to the difference in harvesting style. While early research into the efficacy of impact mills has shown impressive results, including in kochia management, weed seed destructors do come with a hefty price tag that can be a barrier for many farms. Growers can expect to pay somewhere in the range of $100,000 per unit. The mills also require higher horsepower to operate: ideally combines of at least Class 7 or Class 8. Because of this, impact mills currently on the market are geared towards larger grain farms that are both interested in new innovations, and can afford the investment.

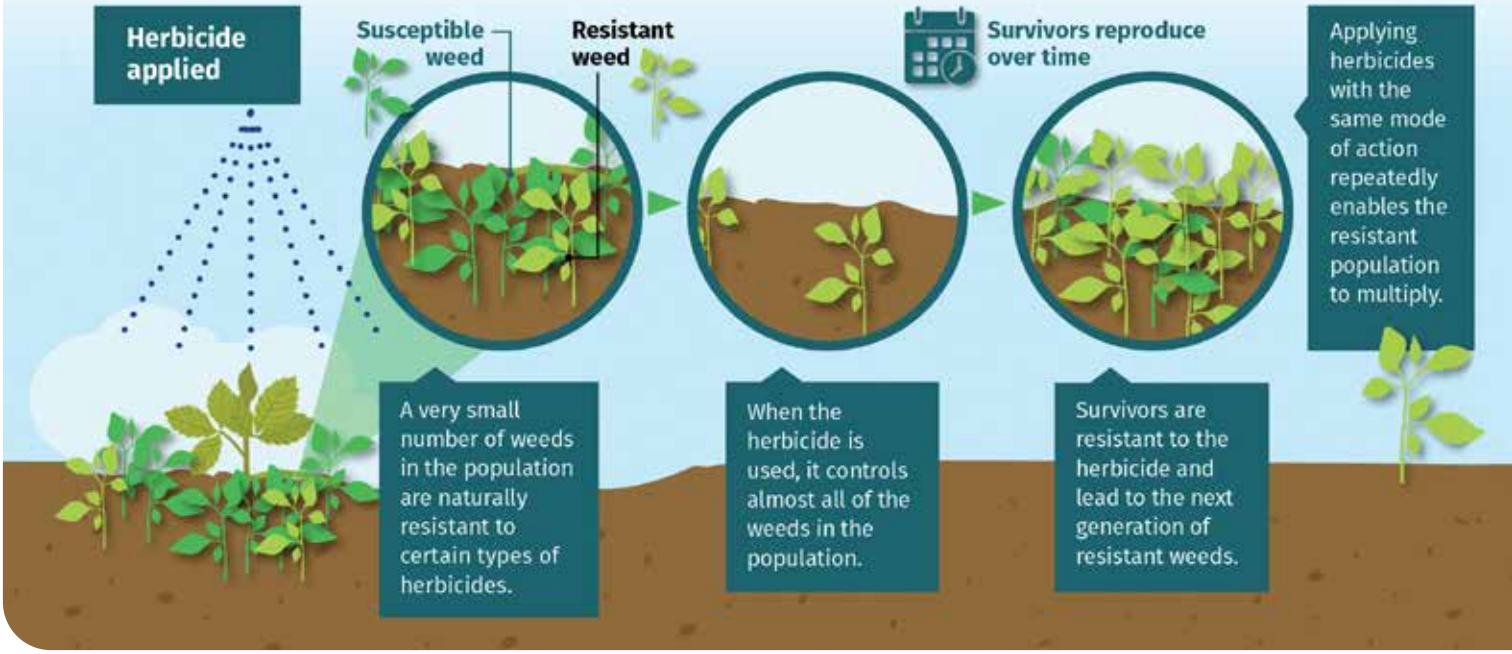
WHAT ARE THE OPTIONS ON THE MARKET RIGHT NOW?

Aside from Redekop Manufacturing's Seed Control Unit (SCU), the remaining big names in the impact mill space are Australia-based. The iHSD unit by de Bruin and Seed Terminator by the company of the same name are the most popular options available to growers today, alongside the SCU. An up-and-coming option for smaller combine units, the WeedHOG, is currently being rolled out by another Australian company called TecFarm.

Overall, HWSC technologies, specifically impact mills, are seeing a marked rise in popularity and uptake across the prairies. The technology offers a novel non-herbicide option for integrated weed management. While the high price point remains the key barrier to more widespread implementation, many early-adopters of the technology are seeing some serious benefits to the efficiency of their operations and overall weed control. Farmers should keep their eye out for new developments in the HWSC space, and continue implementing best practices in terms of weed management in the meantime. FMC

Impact mills, like this SCU one, are mounted directly on the combine, enabling growers to both harvest and control weed seeds all in one pass.

TOP AND BOTTOM: REDEKOP MANUFACTURING



HERBICIDE RESISTANCE:
THE KOCHIA CONUNDRUM

The challenge of herbicide-resistant weeds looms large across Western Canada, posing significant threats to agroecosystem health and productivity. Kochia, specifically, has emerged as one of the most troubling herbicide-resistant broadleaf weeds in the prairies. Its rapid proliferation and impressive adaptability are raising alarm bells for farmers and researchers alike, making it a focal point in the ongoing battle against herbicide resistance.

EVOLUTION OF RESISTANCE IN KOCHIA

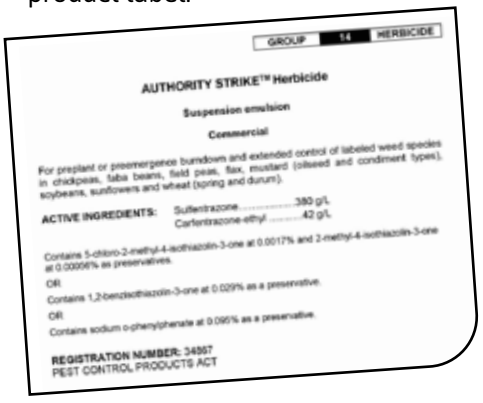
Kochia has several traits that make it a prime candidate for the development of herbicide resistance. Firstly, kochia is a fast-growing, hearty plant that thrives in a variety of growing conditions, including those that many typical cash crops struggle to establish themselves in. This rapid life cycle and ability to grow in tough conditions enables kochia to fill niches with minimal competition and produce plenty of seed. According to Manitoba Agriculture, a single kochia plant can produce up to 25,000 seeds. Since kochia reproduces sexually, this contributes to high genetic diversity within the species, and thus higher likelihood for resistant mutations to occur and reproduce. Additionally, its tumbleweed tendencies mean that kochia spreads seed far and wide, making weed suppression a challenge. As kochia populations rise across the prairies, so too does herbicide use to control it.

HERBICIDE MODES OF ACTION

Herbicides are categorized into groups according to their mode of action. If a product uses multiple modes of action for weed control, it will be found in multiple groups. Herbicides should be rotated to mitigate selection pressure for resistant weed biotypes.

Cory Jacob, Acting Provincial Specialist for Weed Control with the Saskatchewan Ministry of Agriculture, advises farmers "Know what you're applying. I don't mean just the product name, but the active ingredient. There's so many trade names out there, but a lot of the same actives show up." He adds "I want to remind producers to use multiple modes of action."

Growers can determine which group a given herbicide is in by checking the product label. Across the top of the label, there is a white bar with a black box stating the herbicide group number. The active ingredients are also listed on the product label.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Commercial

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ACTIVE INGREDIENTS: Sulfentrazone ..... 380 g/L
Carfentrazone-ethyl ..... 42 g/L

Contains 5-chloro-2-methyl-4-isothiazolin-3-one at 0.0017% and 2-methyl-4-isothiazolin-3-one at 0.0006% as preservatives

OR

Contains 1,2-benzisothiazolin-3-one at 0.029% as a preservative.

OR

Contains sodium o-phenylphenate at 0.095% as a preservative.

REGISTRATION NUMBER: 34897
PEST CONTROL PRODUCTS ACT

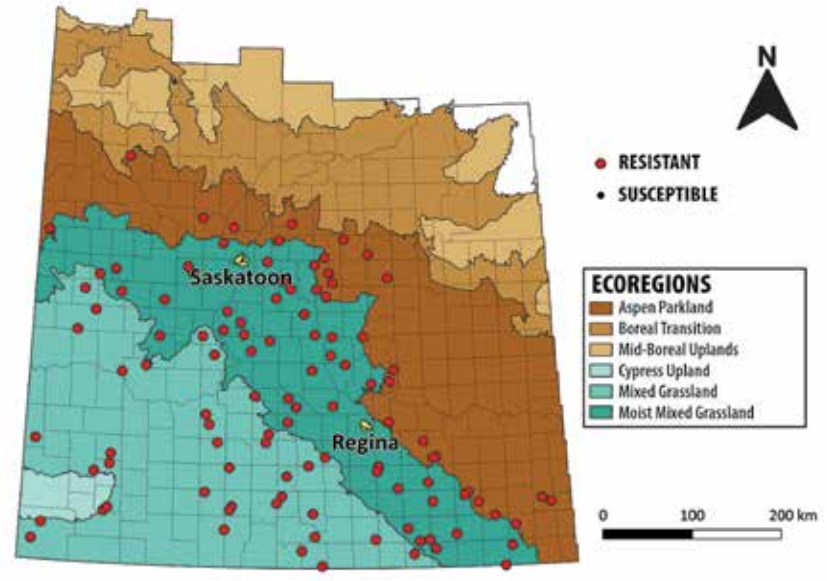
It has been proven over time and space that the overuse of herbicides, and incorrect application, can lead to greater resistance. The International Herbicide-Resistant Weed Database reported that, as of November 2024, there have been 273 herbicide resistant weeds found globally in 72 countries, with numbers constantly on the rise.

CURRENT TRENDS IN KOCHIA

In Western Canada, herbicide resistance in kochia has spread

TOP: MANAGE RESISTANCE NOW

rapidly over the last several years. Currently, all kochia populations are assumed to be resistant to Group 2 herbicides. Resistance to Group 9 (glyphosate) is also now widespread in Western Canada. Resistance to herbicides in Groups 4 and 14 have also been discovered in kochia populations across the prairies. Some kochia populations are resistant to multiple modes of action in tandem. Such populations are referred to as double or triple resistant, wherein they are resistant to two or three herbicide groups. Current strains of triple resistant kochia biotypes are tolerant to herbicides from Groups 2, 4, and 9.



Group 2 resistant kochia biotypes are widespread across the Canadian prairies. As such, all kochia populations are assumed to be Group 2 resistant.

A GROWER'S GUIDE TO LIMIT RESISTANCE

For the battle against herbicide resistance in kochia to be effective, it must be a concerted effort. Farmers are encouraged to do their part by implementing best management practices on their operations.

Consistent field scouting and documentation is a critical step in tracking the spread of kochia and other challenging weeds, and is vital for the curation of management plans for the future. Diverse crop rotations allow for the use of a wider variety of herbicide groups, reducing the selection pressure towards herbicide resistant weed biotypes. Tank-mixing herbicides from multiple groups, rotating herbicide groups, and applying at the correct rates and growth stages ensures better weed control. Together, these practices work to slow the development and spread of herbicide resistant weeds.

Kim Brown, Provincial Weeds Specialist with Manitoba Agriculture, reminds growers "If you can control kochia for a couple years in a row, you can do a really good job of cleaning it up. But you have to be diligent, you have to look long term. It's not just a single year solution, asking *'what do I spray this year?'* it's *'what do I spray for the length of my rotation?'"*

Overall, the increasing abundance of herbicide-resistant weeds like kochia demands a proactive and multifaceted approach from farmers, researchers, and agronomists alike. By collectively embracing best management practices and prioritizing long-term strategies, we can slow the spread and safeguard both crop productivity and the health of Western Canada's agroecosystems. FMC

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THE COST OF KOCHIA:
ECONOMIC IMPACTS ON PRAIRIE FARMS

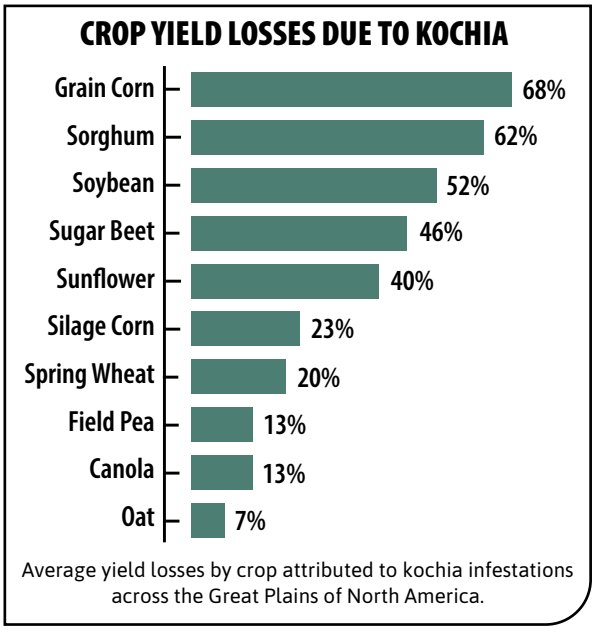
In recent years, kochia has incontestably become one of the most challenging and costly weeds for farmers to manage in Western Canada. Its propensity to produce extremely high volumes of seed, thrive in a wide range of growing conditions, and develop resistance to several different herbicide groups have transformed it into a daunting agricultural challenge.

HOW MUCH DOES KOCHIA COST FARMERS IN WESTERN CANADA?

The cost of managing kochia can vary significantly for each producer, influenced by factors like the size and type of the operation, local weed pressure, and individual management practices. Nonetheless, these expenses can add up quickly. Additional management and labour costs for tasks like crop scouting, documentation, and running equipment, as well as extra expenses to cover fuel, equipment repair, and yield losses can drain financial resources and narrow profit margins significantly.

While the economic impacts of kochia individually have yet to be determined, the management of herbicide-resistant weeds in general (including kochia) costs farmers in Western Canada an estimated $530 million per year collectively. In canola and spring wheat, crop losses due to kochia infestation average 13% and 20% respectively.

Saskatchewan farmland infested with herbicide-resistant weeds continues to increase by more than 0.3 million ha (or 740 000 acres) year over year, according to a 2024 publication by Dr. Charles Geddes and colleagues. Given that the estimated cost of herbicide-resistant weed management sits at more than $33 per hectare, the overall costs associated with managing these herbicide-resistant weeds, including kochia, is expected to continue to rise in the coming years.



Average yield losses by crop attributed to kochia infestations across the Great Plains of North America.

HOW TO KEEP THE KOCHIA PROBLEM FROM GROWING?

While the potential for serious financial burdens as a result of kochia can be unnerving, all hope is not lost. There are several cost-effective strategies that farmers can implement on their operations to manage the spread of kochia and delay the development of herbicide resistance.

When kochia is spotted and confined to smaller areas of the operation, patch management using tools like shallow tillage or targeted spraying can keep management costs in check and limit weed spread. Producers can mitigate the risk of weed seed transfer by ensuring that equipment is cleaned prior to moving elsewhere on the operation.

When applying herbicides, using tank mixes can offer better weed control and also delay the development of herbicide-resistant kochia. Well-managed crop rotations play an important role here too, as they allow for more robust herbicide rotations.

Finally, fostering a competitive growing environment through narrower row spacing, increased seeding rates, and earlier seeding dates represents an accessible and proven effective method for limiting the detrimental impact of kochia.

Despite being a relatively new problem-weed to Western Canada, kochia has quickly climbed the charts in terms of weeds to watch. There are several ongoing studies aimed at quantifying the economic impacts of kochia across the prairies, and determining effective action thresholds for various crops. As reports of herbicide-resistant kochia and associated costs to farmers continue to rise, the need for integrated weed management practices and additional research has become increasingly clear. FMC

MIDDLE: *MANAGING RESISTANCE NOW*, BASED ON RESEARCH FROM GEDDES & SHARPE (2022).

PREVENTING KOCHIA SPREAD:
FARM HYGIENE AND EQUIPMENT MANAGEMENT

With herbicide-resistant kochia becoming increasingly prevalent in Western Canada, it is easy for farmers to feel a lack of control when it comes to weed management. However, by incorporating effective farm hygiene practices, farmers can have more of an impact on kochia populations than they may realize.

WHAT IS FARM HYGIENE?

Farm hygiene, also referred to as agriculture hygiene, includes a number of practices that reduce the introduction and spread of pests and diseases in farming. Farm hygiene practices maintain plant and animal health, and ensure food safety. In terms of weed management, the consistent use of farm hygiene practices can prevent the introduction of weeds to new areas and reduce weed seed banks in the soil over time, potentially increasing farmers' bottom lines.

Kim Brown, Provincial Weeds Specialist with Manitoba Agriculture, says "[Farm hygiene for kochia control] is absolutely crucial!...We know we're not going to eliminate this weed, there's too much of it out there. We see it in cracks in the sidewalks, boulevards in the cities. So it's crucial we do everything possible to control the spread."

Farm hygiene to manage kochia can be implemented in a number of ways. Crop rotations, choosing early-seeded competitive crops like cereals or canola, and regular scouting all help to maintain clean fields and reduce weed pressure. For equipment management specifically, the regular cleaning and sanitizing of farm implements and machinery like seeders, combines, and ATVs reduces the amount of soil and plant debris moving between fields.

Brown adds "In all cases, sanitation is a really important first step in any kind of weed control program, especially with herbicide-resistant weeds, and even more so with multiple herbicide-resistant weeds like kochia."

As Brown explains, to effectively manage the spread of kochia and other herbicide-resistant weeds, sanitation practices, specifically cleaning equipment between fields, becomes a vital step in weed control.

EQUIPMENT CLEANLINESS

While time constraints and logistical challenges can make complete sanitation of equipment between every field impossible, Cory Jacob, Acting Provincial Specialist for Weed Control with the Saskatchewan Ministry of Agriculture, remarks that "anything is better than nothing, even if you give the combine a quick blow off between fields."

Knocking chunks of soil and plant debris off equipment as you exit the field is a good place to start. Additionally, operators can use leaf blowers to remove plant parts, dust and soil from the combine or seeder. If equipment returns to the farmyard between fields, compressed air can be used to get into the tight spots of the machinery even more effectively. Try to focus on the header, straw spreader, and feederhouse where debris might hide. Brown reminds farmers, "You can have weed seeds germinate in the tiniest nooks and crannies!" Therefore, removing as much dust and debris from equipment as possible is of utmost importance, especially in those weedier fields.

When time allows, or after visiting a particularly infested field, operators are encouraged to pressure wash and sanitize equipment for a deeper clean. Brown even floated the idea of mobile wash sites as something that larger operations might invest in in the future as a way to control not only kochia, but other noxious weeds and diseases as well.

In addition to maintaining clean equipment, implementing proactive measures such as early weed control can significantly help to minimize the spread of kochia.

LIMITING THE MOVEMENT OF KOCHIA

One of the best ways to prevent kochia from hitching a ride on equipment between fields is to prioritize early weed control and reduce kochia populations to begin

TOP: KOCSISANY178 - ADOBE STOCK

with. Fewer mature plants in the field means less opportunity for weed seeds to develop and be transferred to other places.

Kochia seeds typically remain dormant in the soil seed bank for only one or two years, which makes their long-term viability essentially a non-issue. Jacob explains "If a producer has a way to exhaust that bank, even over a few years, you'd see a huge difference. The issue is that we keep feeding that seed bank and keep the numbers up."

For bigger farms, Brown and Jacob both recommend harvest weed seed control implements, like impact mills, due to their high weed seed kill rate. With HWSC, there is less concern with seed transferring between fields because the proportion of viable seeds is greatly reduced.

However, once kochia is established in a given area, it's time to switch to playing defense. Brown explains, "During harvest, if we have big patches, we need to try and go around them. We need to try not to put these weeds through the combine." Furthermore, it is best practice to enter fields that are heavily weed-infested last in order to mitigate the risk of seed transfer to otherwise healthy fields.

Both Jacob and Brown advise farmers to implement practices like narrower row spacing and higher seeding rates that stimulate competition between the cash crop and kochia. In saline areas where it may be difficult to get a crop established, Jacob suggests seeding a salt-tolerant forage that will compete with the weeds over time and ultimately keep kochia populations in check.

At the end of the day, Jacob acknowledges that, while these farm hygiene practices are great in theory, "Producers will decide what makes the most sense for them." By choosing at least one farm hygiene practice to incorporate into their weed management plans, farmers can significantly reduce the prevalence of kochia on their operations, even as they navigate the varying economic and operational realities of their individual farms.

While complete eradication of kochia is simply not feasible, taking steps to limit its movement and managing the seed bank through the implementation of farm hygiene practices can empower farmers to regain control over weed populations. FMC

TOP: PAIGE FEHR

KOCHIA CONTROL
IN DROUGHT CONDITIONS

The Canadian prairies are in the midst of a multi-year drought. While some regions saw a temporary reprieve from the dry conditions this past spring, precipitation levels across vast stretches of Western Canada remain well below normal. In October of this year, Agriculture and Agri-Food Canada reported that 57% of agricultural land in the prairie region was abnormally dry or under moderate to severe drought conditions.

It is in these exceptionally dry times that kochia in particular has proved its tenacity. Kochia populations were formerly only seen at concerning rates in the north-central United States and into southern Alberta and Saskatchewan. However, in recent years, under exceedingly hot and dry weather conditions, kochia's range has rapidly expanded northwards and eastwards, bringing with it new farming challenges for producers across the prairies.

KOCHIA EMBRACES THE HEAT

Kochia is an exceptionally drought-tolerant broadleaf weed, boasting several traits that allow it to thrive in challenging growing conditions when most cash crops struggle to perform.

Kochia is classified as a C4 plant, which are often referred to as warm-season plants. In contrast, most cash crops grown in Western Canada — including wheat, canola, barley, and flax — are C3 plants, or cool-season plants. The more efficient photosynthetic process of C4 plants allows them superior drought resilience compared to C3 plants. Additionally, C4 plants typically have waxier leaves that are less prone to water loss as compared to their C3 counterparts.

While C3 plants thrive in more moderate temperatures (20°C - 25°C), C4 plants like kochia are better equipped to endure heat (30°C +) and drought conditions. Under current climate trends, such conditions are predicted to become more frequent and severe, likely favouring the growth of plants like kochia.

Manitoba Agriculture reports that kochia plant roots can extend more than 10 feet deep into the soil to seek moisture when conditions are dry. Kochia is also a high-yielding seed producer and thus generates significant genetic diversity, allowing for impressive and rapid adaptability within the species.

Overall, understanding the growth patterns and adaptability of plants like kochia can help farmers to make informed management decisions during extended periods of dry growing conditions.

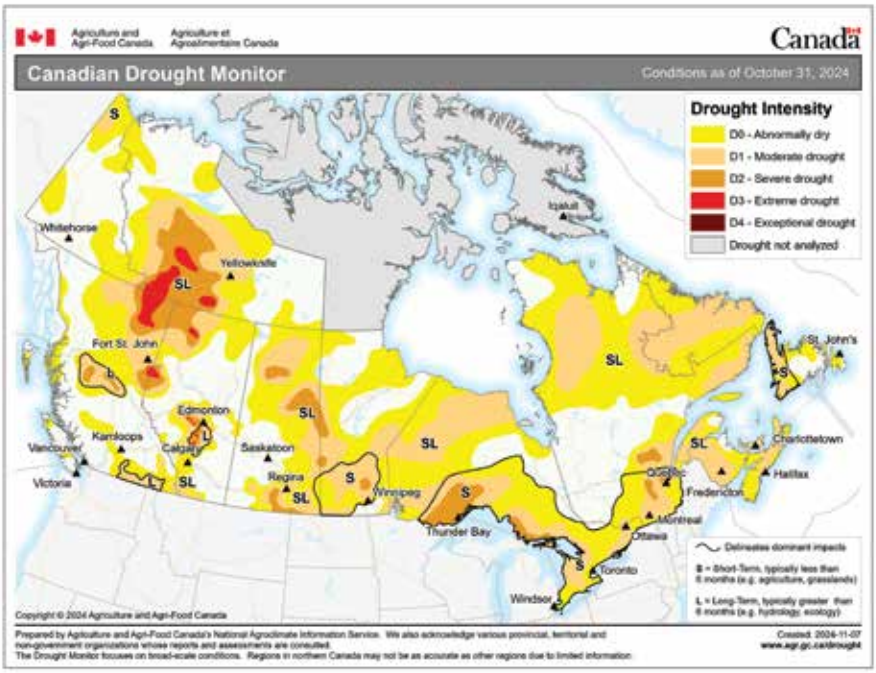
NAVIGATING DROUGHT

In drought years, it is in a farmer's best interest to limit their costs and capture as much water as possible when the rains do come. Growers might also consider reducing fertilizer rates at planting and growing lower-input crops, like cereals, to reduce expenditures when yields are expected to be low.

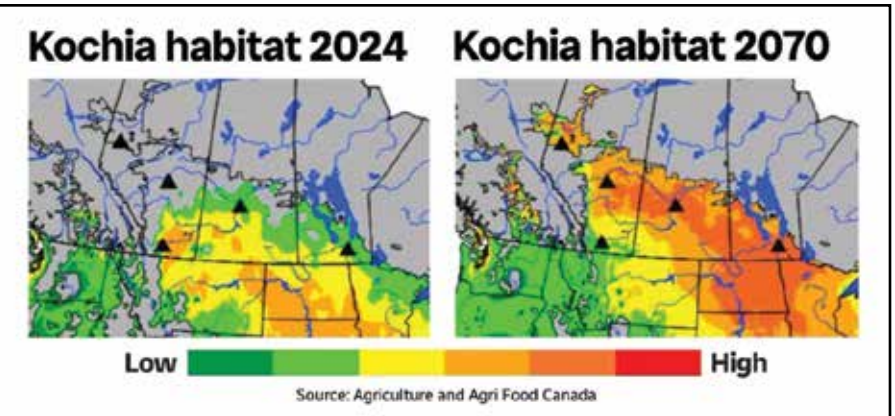
To improve soil moisture, farmers may reduce or eliminate tillage and maintain soil cover through means such as retaining crop residue on the field. Residue-covered fields soak up more water and are less prone to evaporation. Additionally, practices like cover cropping and implementing controlled traffic – where farming equipment travels on the same paths within a field – have been shown to help improve soil quality in some cases, which in turn can improve soil water holding capacity.

In the interest of combatting opportunistic weeds like kochia, farmers are encouraged to keep seeding rates up, even during droughts, to maintain competition and mitigate the risk of warm-season weeds overtaking the cash crop. When available, choose crop varieties with lower water demands.

For years, plant breeders have been working to develop drought resistant cash crops that are suited to the prairie region, including wheat and canola. In the quest for drought tolerance, breeders select for a number of traits including deeper rooting varieties and those with improved water use efficiencies. While most crop varieties used today are certainly moving in the right direction in terms of their tolerance to drier conditions, breeding efforts in this area continue to be a major focus.



Pockets across the prairies – and in fact across the country – remain dry late into the fall season.



Kochia territory in the Great Plains is expected to expand in the coming decades under current climate change trends.

On a positive note, Cory Jacob, Acting Provincial Specialist for Weed Control with the Saskatchewan Ministry of Agriculture, says "One thing for producers to be aware of is, we've been in a drought for awhile here and kochia thrives in those hot, dry conditions. If we do go back to those wet years, we likely won't see kochia being as much of a problem.... we'll see the weed back off a little, essentially." He added that during the wetter cycles, farmers will need to keep an eye out for cooler-season weeds instead, such as wild oats.

In brief, ongoing drought conditions across much of the prairies have not only challenged cash crop production, but also enabled warm-season weeds like kochia to thrive and expand their range. As climate patterns continue to shift, it is crucial for farmers to be adaptable in their practices and focus on integrated management techniques. FMC

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