



THE ULTIMATE GUIDE TO SUCCESSFUL CROP MANAGEMENT

REDEKOP™



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THE EFFECTS OF HERBICIDE CHEMICAL RESISTANCE

It's no secret that farmers deal with a wide variety of agricultural problems every single day. From fickle weather conditions to unwanted pests, the issues that farmers are up against make up a long list. Near the top of that list is herbicide chemical resistance.

WHAT IS HERBICIDE CHEMICAL RESISTANCE?

Herbicide resistance is the acquired ability of an individual plant to survive a chemical application that would kill a normal population of the same species.

HERBICIDE RESISTANCE DOES NOT HAPPEN BECAUSE OF POOR PERFORMANCE OF A HERBICIDE.

Herbicide chemical resistance does not happen because of poor performance of a herbicide. Resistant weeds can often survive the application of herbicide at rates that are much greater than the recommended rate.

WHAT CAUSES CROP CHEMICAL RESISTANCE?

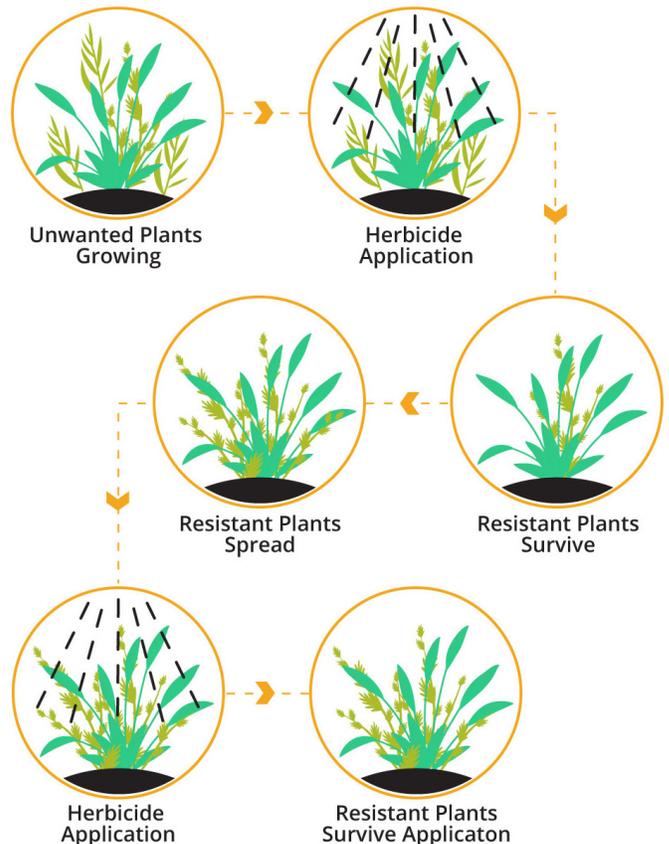
Crop chemical resistance can happen for a variety of reasons, but at the core it is simply that we've used the same chemistry on the same field for

an extended period of time. Resistance is an evolutionary process.

"What happens with herbicide resistance is that we apply our herbicides and kill the weeds that don't have a mutation within the plant that allows it to survive. So the resistance in the plant happens 'naturally' so to speak."

- Dr. Breanne Tidemann, a research scientist at Agriculture and Agri-Food Canada

HOW HERBICIDE RESISTANCE DEVELOPS



**IT'S NOT NECESSARILY BAD
AGRICULTURAL OR FARMING PRACTICES,
IT'S JUST THE REALITY WE LIVE IN;
BIOLOGY ADAPTS TO SURVIVE.**

It's like any evolutionary process — resistant plants that were not controlled by herbicide applications will survive, and over some period of time that plant evolution results in a plant population that is resistant to that chemistry. It's not necessarily bad agricultural or farming practices, it's just the reality we live in; biology adapts to survive.

Not every herbicide application will find a resistant individual. Resistance isn't necessarily all that frequent and there are a number of factors that play into how common it is and how complex it can be. Essentially we're dealing with random mutations in plant populations, selection pressure from the herbicide, and a numbers game in terms of how many plants are being treated to find that one that has the resistant characteristic.

THE EFFECTS OF CROP CHEMICAL RESISTANCE

Herbicide resistance results in weeds that aren't controlled. This means they continue to compete with the crop for nutrients, light, water, etc., and take away from the yield of the crop. "We can also see impacts in quality of harvested crop if the weed seeds are the same size as the crop seed that is harvested — for example cleavers species have seeds that are close in size to canola, which makes them hard to get out of the crop sample, which can result in the harvested sample being downgraded and losing value," says Tidemann. "Weeds that aren't controlled can also serve as a vector for insects or diseases and help maintain their populations. Herbicides are one of the most effective and efficient ways of managing the weeds and each case

of herbicide resistance decreases a farmer's options in terms of strategies for managing that weed."

There are similarities between herbicide resistance and something like antibiotic resistance. Whether you are dealing with weeds or bacteria, resistant populations decrease options available for control. The worst case scenario is that you'll end up with a field with limited cropping options, because effective herbicide control options are limited due to resistance. If the crop being grown is tolerant to a specific group of chemistry and the weed population is resistant to the same chemistry, you have a problem!

**THE WORST CASE SCENARIO IS THAT
YOU'LL END UP WITH A FIELD WITH
LIMITED CROPPING OPTIONS, BECAUSE
EFFECTIVE HERBICIDE CONTROL OPTIONS
ARE LIMITED DUE TO RESISTANCE.**

However, any excess weed pressure you can't control chokes off your ability to get good yields on your fields. Therefore, even with relatively low populations of resistant weeds, further pressure on the system by using the same chemistries on the same populations will promote reproduction of the resistant biotype. That resistant population will increase and spread, resulting in all of the difficulties that come with managing weedy fields.

Overall, limited options in terms of what crops you can grow and an economic loss due to increased weed pressures are the biggest concerns from a resistance perspective.

MANAGING CHEMICAL RESISTANCE WITH CROP ROTATION

MANAGING CROP CHEMICAL RESISTANCE

Historically, as an industry, farmers have tried to use crop rotation, chemical rotation, and combine multiple modes of action and different groups of chemistry together to manage resistance, and extend the useful life of the chemicals to make them more effective for a longer period of time. A lot of that has been extremely successful, and many farmers are able to avoid it. The biggest problem you can run into is when you have narrow crop rotation and very narrow chemical use — that's when you'll run into the most accelerated problems with resistance.

THE FARMER'S TOOLS FOR MANAGING RESISTANCE:

- HERBICIDE GROUP ROTATION
- CROP ROTATION
- INCREASED SEEDING RATE
- SILAGING OR MOWING
- GRAZING
- WEED MANAGEMENT

Unfortunately there are some weeds out there that have no chemical controls. That's a different scenario altogether. You can include mechanical tools, but in this extreme scenario, your options become very limited.

But in the less extreme cases — (i.e. if the resistance is just starting to show up, or it's not the entire field at risk) — then you have more tools at your advantage to try to keep things under control.



Herbicide Group Rotation



Crop Rotation



Increased Seeding Rate



Silaging or Mowing



Grazing



Weed Management

CROP ROTATION

Crop rotation is the practice of planting different crops, one after the other, on the same plot of land in order to improve soil health, optimize nutrients in the soil, and combat pest and weed pressure.

A simple crop rotation might involve two or three different crops, whereas a more complex rotation might involve more than a dozen different crops.

Since different crops have different needs and are vulnerable to different pests, if a farmer plants the exact same crop in the same place every year, they continually host the same sets of insects and disease. Pests and other diseases know what they will be getting and they set up a permanent home there. Decreased diversity also selects for specific species of weeds. Qualities of crop types, including competitiveness, planting and harvest timing, herbicide options, days to maturity, along with many other factors will naturally select for specific weed species. When this happens, increasing levels of chemical fertilizers and pesticides become necessary to keep yields high while keeping bugs and disease to a minimum.

Crop rotation works by increasing biodiversity, and interrupting the lifecycle of pests, weeds, and other diseases.

SEED CONTROL UNIT

Mechanical tools, like Redekop's seed control unit, provide another way to fight off resistance. The seed control unit is a flexible and cost-effective solution that has kill rates of greater than 98 percent.

The unit works on any seed that can be physically harvested by killing the seed, and in turn reducing the weed bank and weed pressure in that field. The unit can also be easily turned on and off for farmers who have low weed pressure or are dealing with a non-harvestable weed. Remember that the current crop becomes a weed next year! Some of the worst 'weeds' are glyph tolerant crops / rotations that are harder to control (eg. barley on wheat).

"We're not going to cure a hundred percent of the resistant weed issues. But if we can do our job to reduce the weed pressure, we think that means the competitiveness of the crop is going to be higher, herbicides are exposed to a reduced weed population, resulting in an increased effectiveness

of the chemistries that we're using," says Trevor Thiessen, president of Redekop Manufacturing. "It's no different than someone trying to weed their lawn. The more weeds you have, the more challenging it is to get a good look at the lawn. So if you can pick out 80 percent of the weeds, the lawn can compete pretty well."

"THE MORE WEEDS YOU HAVE, THE MORE CHALLENGING IT IS TO GET A GOOD LOOK AT THE LAWN. SO IF YOU CAN PICK OUT 80 PERCENT OF THE WEEDS, THE LAWN CAN COMPETE PRETTY WELL."

**- TREVOR THIESSEN,
PRESIDENT OF REDEKOP MANUFACTURING**

The ultimate goal when it comes to managing crop chemical resistance is to combine and utilize multiple strategies. By combining crop rotation, multiple different chemistries, and mechanical tools like the seed control unit, you will have the best shot at reducing weed pressure and managing resistance.

"There are resistant weeds popping up all over the place in western Canada and the US and Europe and Australia. The key is staying ahead of it by using all these tools in our toolbox and being creative enough to not get in a spot where a resistant weed has taken over so completely that the fields are now unmanageable," says Thiessen. "Now with harvest control tools, we've added another piece of the puzzle to help the farmer increase his options."

PREVENTING CROP CHEMICAL RESISTANCE

Total prevention is difficult — if you are using herbicides, you are applying a selection pressure for resistance. Using the strategies above for management can help delay the evolution of resistance, and if enough other strategies are used it could be a long-term delay.

THE WORST CASE SCENARIO WITH RESISTANCE IS THAT YOU'LL END UP WITH A FIELD THAT YOU CAN'T PLANT ON ANYMORE, BECAUSE YOU'VE BUILT UP SO MUCH CHEMICAL RESISTANCE.

That means using multiple strategies. "The reality is that we're always going to have weeds in our fields. They aren't going to go away," says Thiessen. "I think the things that we're doing — crop rotation, using chemistries, and mixing it up and making sure we're not cutting rates, and then the third piece is adding new tools like mechanical tools, like harvest control tools. Those are all things to help us with the prevention process as well."

However, the best way to prevent crop chemical resistance is simply to not ignore the problem. "If you have resistant weeds popping up, no matter how you want to deal with them, you have to deal with them," says Thiessen. "In different parts of the world the resistant weeds are starting to grow. Very rapidly. The number of incidents that we saw five or 10 years ago is a fraction in some parts, where now 70 or 80 percent of the field will show some sign of it. So that's lesson number one — don't pretend like it's not going to happen, because it's probably going to happen. We just need to be aware of it and be proactive."

COMMON RESISTANT WEEDS

PALMER AMARANTH

Palmer amaranth has the ability to very quickly develop resistance to herbicides. According to Chemical & Engineering News, "Weed scientists and agriculture chemical company experts describe the many ways that biology and growth habits make this king of weeds uniquely difficult to kill or contain. It will likely require brand-new technology—technology that does not yet exist—to regain the upper hand."

When Palmer amaranth survives herbicide application, it becomes a major roadblock to farmers' yields. More than other weeds, it outcompetes crops for nutrients, water, and even sun. When uncontrolled, the weed can cause crop yields to drop 50% or more. This is likely why the Weed Science Society of America voted it the United State's most troublesome weed in 2017.

ANNUAL RYEGRASS

Annual ryegrass is a serious and costly weed, found commonly in places like southern Australia, as well as North America. Annual ryegrass is highly adaptable and competitive, and can compete with crops very early in the growing stages. It also acts as a host for certain types of bacteria.

According to the Government of Western Australia, "many populations of annual ryegrass have developed resistance to both selective and non-selective herbicides. Repeated use of herbicides from the same mode-of-action group (particularly the high-risk Groups A and B) have led to herbicide-resistant individuals."

KOCHIA

Kochia has been identified as one of the most dangerous weeds in the West. This drought-loving weed can be difficult to manage, mostly because of its ability to spread and quickly establish itself as a major weed.

According to The Western Producer, “Kochia, like humans, is a serial out-crosser, meaning that each of a mature plant’s 25,000 seeds are individuals with unique characteristics, accommodating multiple mutations and future natural selection to a variety of perils.”

Kochia’s ability to resist Group 2 herbicides means it has become hard to control in pulse crops. “Just 21 plants per sq. metre reduce wheat yields by one-third. The plant can be devastating in flax and pulse crops, choking out broadleaf crops for sun and moisture.”

FUTURE CHALLENGES

One challenge that Dr. Tidemann foresees is more resistance being selected. “As we continue to rely on herbicides for our weed management we will continue to see more cases of resistance evolve,” she says. “Introduction of new weeds with already established resistance – there are weeds in the US that, particularly with climate change, may make their way north, many of which have multiple herbicide resistance (resistant to multiple herbicide groups) and will be very difficult to manage. Evolution of more multiple resistance in already resistant weeds in Canada.”

Do environmental changes have an impact? “To some degree, yes,” says Thiessen. “I think the environment and the climate from year to year will change and have some impact on how these crops react. But I don’t think it really changes the trajectory long term of the resistance issue. I think it just changes the fact that a resistant crop in any given year might be more or less dominant.”

A weed’s secret weapon is seed longevity. According to Successful Farming, most annual weedy grass seeds die after two-to-three years, but some broadleaf weed seeds can remain viable for decades.

Why the difference? Weed seed coats play an important role. “Weed seeds that have a hard seed coat are more likely to survive the trials and tribulations that occur when they fall into the soil,” according to Successful Farming. A number of other factors can determine how likely a weed seed is to survive. These include disease, environmental factors, insects, soil and light.

A bigger issue, according to Thiessen, are social and political impacts. “As a global trend, we’re not excited about chemical use. So we could see farmers in different parts of the world losing options to manage weed resistance because of political or social pressure. By reducing and eliminating chemical use, we could find other problems in our cropping, which will ultimately affect yield and affect the farmers ability to grow crops and produce food.”

The rate of innovation in the chemistry market has slowed. So as we look to the future, we can’t rely on some miracle chemical coming onto the market to take care of this issue. It’s not going to get better on its own. Farmers need to actively manage it by being proactive and using all the tools at their disposal.

AGRICULTURAL PESTS AROUND THE WORLD

Farmers have been dealing with agricultural pests since farming began, over 11,000 years ago. Pests damage crops and reduce yield, cutting into grower's profit. With global food demands rising, farmers are working harder than ever to sustainably produce healthy crops and meet these challenging demands. With the right management strategies, farmers can help protect their crops from the negative impacts of agricultural pests.

WHAT ARE AGRICULTURAL PESTS?

Pests aren't just insects or rodents. Agricultural pests can include weeds, diseases, rodents, and plant-feeding insects and mites. According to Science Direct, these pests are estimated to destroy as much as one-third of all agricultural yield.

The focus of this article will be on insect pests and diseases, as well as how to combat them.

ALTHOUGH INSECT SPECIES AND CROP TYPES MAY VARY BETWEEN REGIONS, THE DETRIMENTAL EFFECTS OF CROP DAMAGING INSECTS IS UNIVERSAL.

TYPES OF AGRICULTURAL PESTS

Insect pests are a universal threat that affect crops all over the world. Although insect species and crop types may vary between regions, the detrimental effects of crop damaging insects is universal. In agriculture, it is essential that farmers understand

the economic impact of an insect species on a crop and methods to prevent or mitigate significant populations.

Below are a few common insect pests that could be affecting your crops.

COMMON INSECT PESTS



Grasshoppers



Japanese Beetles



True Bugs



Flea Beetles



Cutworm

COMMON INSECT PESTS

GRASSHOPPERS

Grasshoppers often pass through agricultural land in swarms. They are not picky eaters and will feed on almost any kind of plant, inflicting huge amounts of damage in a very short period of time.

JAPANESE BEETLES

According to Insect Cop, Japanese Beetles were first introduced to the United States in the early 1900s and very quickly became a problem for farmers. The larvae eat grass roots while the adults feed on leaves, flowers, and fruit. Unfortunately, they have few natural enemies, which makes them a tough pest to get rid of.

TRUE BUGS

True bugs are one of the most common agricultural pests, encompassing all insects of the Order Hemiptera. Some of these insects are more commonly known as cicadas, aphids, planthoppers, leafhoppers, and shield bugs. They damage using their piercing mouthpieces to penetrate into the plant and suck out its juices. True bugs are very small, but their rapid proliferation, and often small size, may go undetected and can cause severe damage to crops. Some of these pests may play as vectors in the spread of plant disease.

FLEA BEETLES

Flea beetles can cause significant reductions in plant stand and vigour of seedling canola and mustard crops. Flea beetles first attack the plants at their most vulnerable stage, between emergence and the growth of new leaves. This can impact the crop for the rest of the growing season.

CUTWORM

Cutworms are the larvae of several species of night-flying moths. They are a common pest of many vegetable crops, and are damaging during the larval stage where they reside in topsoil, cutting through plant stems and leaves. Occasionally, cutworms attack the foliage or fruit of some vegetable crops.

WHICHEVER INSECT PEST YOU ARE DEALING WITH, CORRECT PEST IDENTIFICATION, UNDERSTANDING OF ECONOMIC IMPACTS, AND EMPLOYING EFFECTIVE CONTROL OR MITIGATION STRATEGIES ARE KEY IN PROTECTING A FARMER'S INVESTMENT.

THE EFFECTS OF AGRICULTURAL PESTS

There are two kinds of crop damage caused by insect pests, according to Agrivi:

- **Direct injury** to the crop, which is caused by insect feeding.
- **Indirect damage** to the crop in which insects transmit diseases. These types of insect pests are called vectors.

Direct injury is the most common type of crop damage, however, insects can still cause serious damage by transmitting diseases as well. The most common diseases transmitted are viral, bacterial, or fungal diseases.

Agrivi also notes that Insects can transmit disease in three different ways:

- **Accidental or incidental transmission.** This is where the disease occurs during insect feeding or oviposition, where eggs are deposited.
- **Passive transmission.** This is where the insect transmits the disease from one plant to another, without actually feeding on the plant.
- **Active transmission.** This is where the disease occurs when the insect that carries the pathogen feeds on a plant, and then moves on to a healthy plant and transmits the pathogen.

INSECTS HAVE THE POTENTIAL TO SEVERELY HARM CROP PRODUCTION, AND CAUSE SIGNIFICANT LOSSES FOR FARMERS.

Insects have the potential to severely harm crop production, and cause significant losses for farmers. That economic loss is not only measured by estimating impacts on yield. The cost of insect control must be equal to, or less than, the loss in profit that would result from uncontrolled insect populations.

MANAGING AGRICULTURAL PESTS

There are currently a wide array of pest control tools available to farmers. These tools include both preventative and defensive measures.

Preventative measures include planting resistant non-host varieties, adaptation of planting and harvest timing, selecting non-host crop types in crop rotation, varietal blending, and thoroughly cleaning seed.

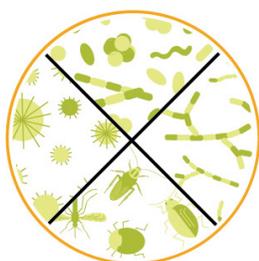
Defensive measures are broken down into four main categories:

- **Biological.** This includes the use of natural enemies (using various beneficial viruses, fungi, bacteria, and insects as predators).
- **Cultural.** This includes weather tracking and the monitoring of fields and crops.
- **Physical.** This includes disinfection of the soil, seed, and seedlings.
- **Chemical.** This includes the use of insecticides.

Applying insecticides is the most common protection method used by conventional farmers. Unfortunately, resistance to insecticides in agricultural pests is an urgent problem that affects farmers worldwide. Also, environmental regulations

are increasingly limiting the use of chemical insecticide in efforts to increase sustainability, ensure safety of consumption, and protect other susceptible neutral or beneficial insect populations. Because of this, it's best for farmers to take an integrated approach when it comes to managing agricultural pests. This means combining insecticide use with the use of various biological, cultural, and physical measures as well.

DEFENSIVE MEASURES



Biological



Cultural



Physical



Chemical

INTEGRATED PEST MANAGEMENT

According to Science Direct, integrated pest management is a sustainable approach to managing pests by combining different tools and strategies including insecticides, natural predators, cultural practices, and host-plant resistance in a way that minimizes both economic and environmental risks. The purpose of IPM is to balance the need for pest control with the desire to avoid, or at least reduce, the negative impacts of heavy pesticide use.

THE PROCESS

1. **Inspection.** The IPM process starts with inspection and identification of the pest. During this stage you'll want to identify beneficial, neutral, and harmful insects.
2. **Monitoring.** After inspection, monitoring begins immediately, including tracking pest populations, life cycle and stages, as well as factors that influence the degree of crop feeding and damage.
3. **Set thresholds.** Set limits for tolerable pest damage. Determine insect populations required to negatively impact yield to the point where the cost of control methods maintain profit.
4. **Plan.** Establish an effective plan of control before pests cause concern.
5. **Action.** Take prompt, effective action when economically significant populations are realized.

Many experts see IPM being employed as part of a redesign of the crop management system aimed at lowering pest pressure, while also reducing pesticide use. The development of IPM can be more time-consuming than simply using pesticides to control the problem. However, the use of several tactics working together is a farmer's best choice to combat stubborn pests and diseases, while avoiding chemical overuse and resistance. This will ultimately provide economic savings for the farmer, while protecting both the environment and human health.

THE USE OF SEVERAL TACTICS WORKING TOGETHER IS A FARMER'S BEST CHOICE TO COMBAT STUBBORN PESTS AND DISEASES, WHILE AVOIDING CHEMICAL OVERUSE AND RESISTANCE

AG SOLUTIONS THAT DRIVE PROFIT

Whether you work in agriculture or any other industry, increasing profit margins is one of the topics that always remains top of mind. For farmers, increasing profit margins means maximizing labour, spending efficiently, and increasing revenue so that the business retains as much profit as possible. As all farm managers know, increasing profit isn't as simple as raising the prices of commodities.

AS ALL FARM MANAGERS KNOW, INCREASING PROFIT ISN'T AS SIMPLE AS RAISING THE PRICES OF COMMODITIES.

Fortunately, there are a variety of strategies that farmers can adopt to maximize profits without sacrificing the quality of their product, while maintaining strong relationships with buyers.



MANAGE COSTS

There are plenty of ways to manage costs and cut back on unnecessary expenses as a farmer. However, before you can do that, you need to ensure that you are keeping records of everything. Recording expenses such as input purchases, equipment maintenance, farmland costs, employee wages, etc., is a good way to identify areas where you could cut back. The first step to cutting costs is knowing what you can do without and what you need to keep.



MAXIMIZE YIELDS

This one might seem obvious, but there are plenty of ways that a farmer can influence his productivity and set for success.

PLANT TIMELY AND EFFICIENTLY

Farmers need to be strategic about seeding intentions. Factors such as soil temperature, water saturation, the number of days the crop requires to reach maturity and logistics are all important considerations in planning for success. According to Farm Management, various tests can be performed to test how ready your soil is. Seeding too early, or too late, limits yield potential.

The first step in preparing for a successful seeding season starts the year before, when the combine is setting the stage for next year's crop. Redekop's Mav Straw Chopper, is a valuable tool in preparing your land for seeding by ensuring a consistent, fine cut, while allowing your seeder to cover more ground with greater accuracy at a faster rate.

UNDERSTAND YIELD POTENTIAL

Understanding the yield limiters of local crops and conditions, as well as becoming educated about the specific crops being grown, will help manage expectations. When selecting crop types and varieties, it is essential to understand benefits and detriments of options available in the market. Understanding and planning for realistic production goals is crucial in increasing profitability.

ENSURE PROPER WATER MANAGEMENT

Water is an essential part of farming, and crops rely on proper water management for survival. It's important that farmers manage their land with the

goal of providing crops with enough water, without suffering the penalties of field saturation. Proper drainage will prevent water logging, mitigate disease and balance the soil pH, which is important for healthy plants.



UTILIZE CROP ROTATION

When the same crop type is planted in the same place year after year that ground will amplify selection and proliferation of weeds, insects and diseases that crop is most susceptible, or least competitive, against. When this happens, increasing levels of chemical fertilizers and pesticides become necessary to keep pest populations below economic thresholds.

Crop rotation is the practice of planting a variety of crops, consecutively, on the same plot of land in order to improve soil health, optimize nutrient requirements, and combat pest pressure. Proper crop rotation strategies result in healthier crops, healthier soil, adjustable fertilizer costs, and a decreased reliance on pesticides, all of which will increase yield and allow farmers to chase higher yield targets and ultimately retain a greater percentage of their revenue.



SELL TO LOCAL BUSINESSES

Supporting local has become a popular trend. With more and more people looking to adopt greener lifestyles, live sustainably and reduce their carbon footprint, the demand for locally grown products has increased. As such, grocery stores are prioritizing buying locally to meet these consumer demands.

Farmers should take advantage of this demand. According to Chron, selling to local community markets and grocery stores can help a farmer decrease transportation costs. A decrease in shipping cost increases profit margins by cutting

down on fuel costs, reducing strain on delivery equipment and decreasing the time required of the deliverer, thereby reducing company payroll.



ADOPT NEW TECHNOLOGIES

Traditionally, the adoption of new equipment is slow in the agricultural community. This slow adoption is, in many cases, costing farmers in the long run. According to Chron, purchasing more efficient farm equipment, including tractors, seeders and combines, can help reduce a farmer's equipment costs in the long term. It's true that farmers will see increased costs up front to cover the purchase of more energy-efficient equipment. However, farmers will also see big savings in fuel efficiency and significant decreases to maintenance costs compared to older equipment.

One of the front runners in new equipment technology can be found in Redekop's seed control unit. By physically destroying weed seeds, Redekop's SCU provides a novel way to combat chemical resistance and dramatically decrease reliance on expensive and frequent chemical applications. The seed control unit is a flexible, cost-effective solution that features low power requirements and running costs, ultimately increasing a farmer's profitability.

TAKING AN INTEGRATED APPROACH TO LOWERING COSTS IS THE BEST WAY TO GUARANTEE SUCCESS.

The solutions outlined above are some simple ways you can increase profit margins for your farming operation. Taking an integrated approach to lowering costs is the best way to guarantee success.

CROP COMMODITY PRICES

The last two decades have seen crop commodity prices become volatile all over the world. The current trends seen in world agricultural markets can be vastly different from year to year, making it challenging for growers to predict financial outcomes.

According to the OECD, looking forward to 2025, “the biggest market changes will occur in developing countries. On the demand side, continued but slowing population growth, rising per capita incomes and urbanization will increase the demand for food and prompt consumers to diversify their diets by increasing consumption of animal protein relative to starches. For this reason, the prices of meat and dairy products are expected to increase relative to the prices of crops. Among crops, the prices of coarse grains and oilseeds, used for animal feed, should rise relative to the prices of food staples.”

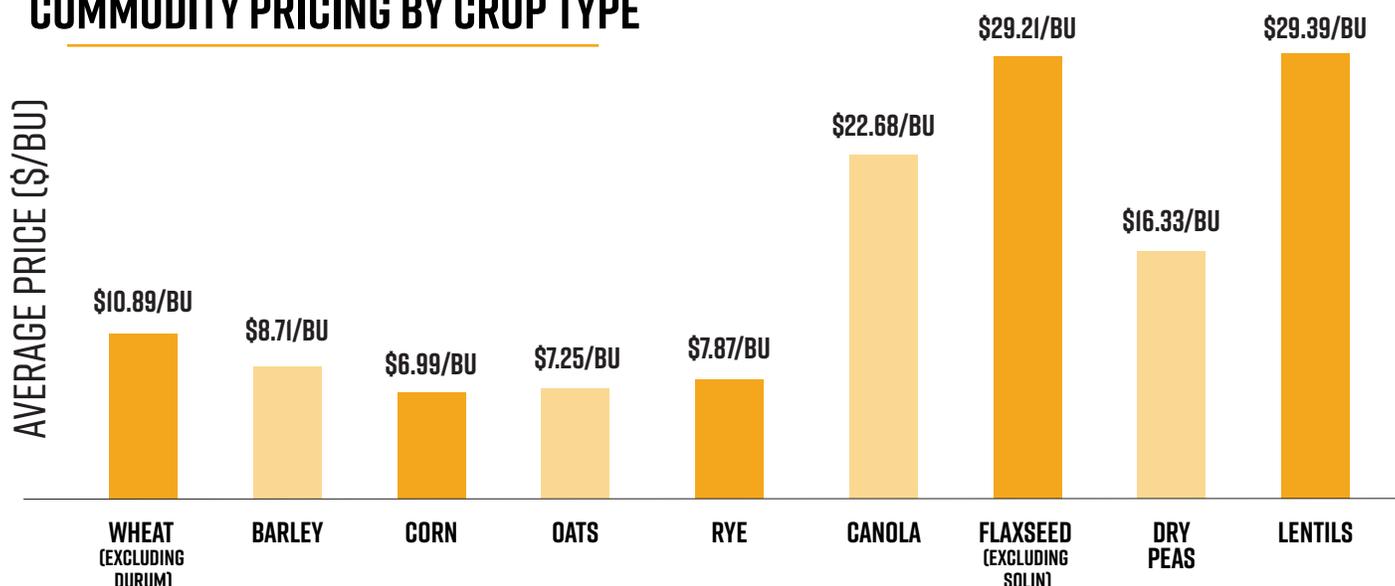
CROP COMMODITY PRICES ARE CHANGING

In the past 10 months Canadian crop commodity prices have increased when compared to normal or historical levels.

Kent Anholt, Operations Manager/Merchant at Rayglen Commodities Inc, speaks to the volatility of pricing. “Commodity markets have been on turbo for the last three quarters of a year with multiple different commodities hitting all time price highs from durum in the low twenties per bushel to canaryseed trading at better than 55 cents/lb picked up on farm. We have seen new watermark prices on commodities like canola, flax, and mustard that blow the previous highs out of the water. Low supplies, world weather issues, supply chain issues, speculative money pouring into Ag are all partial reasons for the price volatility around the globe.”

According to the Government of Canada, below is some of the commodity pricing we can expect to see into 2022.

COMMODITY PRICING BY CROP TYPE



THE FUTURE OF CROP COMMODITY PRICES

The onset of COVID-19 has had a big impact on crop commodity prices in a number of different ways. Supply shortage opportunities, issues with worldwide logistics, including container shortages and government lockdowns, and food aid programs have all caused market shifts in one way or another.

THE ONSET OF COVID-19 HAS HAD A BIG IMPACT ON CROP COMMODITY PRICES IN A NUMBER OF DIFFERENT WAYS.

“From this year, I would bet we will see considerably lower values than what we see today,” says Anholt. “One hopes that some of the values we are seeing establish some new, higher, normal trade ranges for our markets, but supply and demand will ultimately dictate and a world market will have lots to say about that.”

The economic outlook, for the world and Canadian grain markets, is expected to continue being affected by the international uncertainty caused by COVID-19, rising energy prices, and increased fertilizer and transportation costs.

WHAT GROWERS NEED TO KNOW

Anholt says that it’s paramount to know what your profit levels are based on your ever-changing expenses and production.

“Knowing these levels will be instrumental in helping to make marketing decisions that best suit your farm. The numbers we are seeing today are not sustainable forever; know when to take some risk off the table.”

Anholt also says that the most successful growers use a few handy rules in terms of grain pricing.

SELL FOR A PROFIT

Recognize when profitable commodity prices are on the table rather than hoping to sell in the future for the highest price.

PRACTICE INCREMENTAL SALES

Piecemeal commodity sales as prices move up, you may never be totally right in those sales but you’re never totally wrong either.

REMEMBER THAT NO TWO YEARS ARE ALIKE

Just because something worked this year does not mean it will work next year and vice versa; a failure one year could be a success the next.

HAVE A BROKER ON YOUR TEAM

A good broker helps keep you up to date on pricing and on top of pricing and program opportunities. Anholt and the brokers at Rayglen work with growers to strategically sell for a profit.

ENHANCING CROP YIELD YEAR OVER YEAR

No matter what type of crop you're dealing with, growers everywhere all strive for the same thing - enhancing crop yield. Crop yield is widely considered to be the most important measure of a grower's performance. Therefore, timely and accurate crop yield estimates are crucial for economic forecasting and risk assessment as it pertains to agricultural production. Understanding your crop yield, including ways you can improve it, has a direct impact on how profitable your land will be.

UNDERSTANDING YOUR CROP YIELD, INCLUDING WAYS YOU CAN IMPROVE IT, HAS A DIRECT IMPACT ON HOW PROFITABLE YOUR LAND WILL BE.

WHAT IS CROP YIELD?

Crop yield is the measurement used to determine the amount of agricultural production harvested per unit of land area. In other words, crop yield refers to how much crop is actually produced, and determines how efficient land is used in order to produce these crops.

Crop yield is typically measured in bushels, whereas pricing is usually measured in tons.

HOW IS CROP YIELD MEASURED?

According to Investopedia, in order to estimate crop yield, producers usually count the amount of a given crop harvested in a representative sample area. The

harvested crop is weighed, and the crop yield of the entire field is extrapolated from the sample. There are many different tools used to collect yield data. Examples include combine monitors, installable devices to digitally measure grain volume harvested by combines, weigh wagon scale tickets, and measuring bin space.

EFFECTS ON CROP YIELD

Crop yield is affected by many factors including climate, soil fertility, seed quality, and pests and diseases.

CLIMATE

Climate is one of the most important factors in determining crop yield. According to Omnia, climatic conditions extend beyond just "wet" and "dry". Other factors to consider include humidity, temperature, wind, increased prevalence of pests during certain climate conditions, and weather patterns.

"Planting crops outside the specific climatic region that they are adapted to will negatively impact crop yield. Erratic weather patterns also pose an immense risk to crops, as they can cause extensive damage to crops and may create highly favourable conditions for certain pests and weeds to thrive."

EFFECTS ON CROP YIELD



Climate



Soil Fertility



Pests and Diseases

SOIL FERTILITY

There are 18 nutrients that are essential for proper crop development, according to Omnia. For dryland farming soil is the main source of these nutrients, therefore soil fertility can impact crop production. Too little, or the complete absence, of any of these nutrients will negatively impact crop yield.

PESTS AND DISEASES

Pests and diseases are another factor that can limit crop yield. There are many different types of pests and diseases, and they can cause damage to your crops in a variety of ways.

WAYS TO ENHANCE CROP YIELD

As a grower, your efficiency is determined by how much you can produce within a given amount of land. You want to ensure that you are maximizing your production by taking advantage of agricultural practices that can help you increase yields. Here are a few.

UNDERSTAND AND MONITOR YIELD POTENTIAL

Understanding the yield limiters of local crops and conditions, as well as becoming educated about the specific crops being grown, will help manage expectations. Planning for realistic production goals and proactively managing potential yield limiters is crucial in increasing yield, and in return, profitability.

Once your crops are planted, monitoring for any signs of damage from pests or disease, as well as monitoring weather patterns, can help protect your targeted crop yield.

ENSURE GENETIC VARIATION

According to Nature, the agriculture industry has high demands to meet over the coming years in regards to food security.

“The key to addressing this challenge is a deeper understanding of genetic variation and the molecular, cellular and developmental pathways by which plants dynamically respond to and interact

with their environment and pathogens, while maintaining growth, efficiency of nutrient use, and fitness. New crop varieties ideally will have genetic combinations that alleviate losses from the multiple environmental and pest constraints that are encountered during the crop lifecycle in a farmer’s field.”

UTILIZE CROP PROTECTION METHODS

Crop protection methods, such as integrated pest management practices, herbicides, insecticides, and fungicides, can help lessen the impact of pests and diseases on crop yield.

Unfortunately, some pests will develop resistance to chemical methods, so it is important to adopt a multi-prong approach as outlined in ‘Managing Chemical Resistance with Crop Rotation’.

INTRODUCE MECHANICAL TOOLS

Mechanical tools, like Redekop’s seed control unit and MAV straw chopper, provide an innovative solution to protect crop yield.

The seed control unit reduces the viable weed seed bank, resulting in reduced weed populations in the field it is used on. The MAV straw chopper finely cuts and spreads crop residue to prepare your land for seeding, allowing for even germination and emergence of seed and preventing plugging of crop debris in seeding and harvesting equipment.

When dealing with crop yield, it’s best to approach it with as many tools in your arsenal as possible. The methods above will help you lessen the impact of any challenges you encounter, while preparing you to protect yield and profits.

USING COVER CROPS TO SOLVE WEED PRESSURE

It doesn't matter where you live or what methods you use, all growers deal with weeds at one point or another. Weed pressure refers to the effects of weed growth in a field. Weed pressure is a serious issue, and has negative effects on yield and profit. Growers can lessen the effects of weed pressure by being proactive and using preventative measures such as planting cover crops.

WHAT ARE COVER CROPS?

Simply put, cover crops are plants that are planted to cover the soil, rather than for harvesting. According to Sustainable Agriculture Research and Education (SARE), cover crops are a long-term investment in improved soil health and farm management. While you may begin to see results from cover crops within the first year, it may take a few years before you see a positive financial return.

COVER CROPS ARE A LONG-TERM INVESTMENT IN IMPROVED SOIL HEALTH AND FARM MANAGEMENT

THE BENEFITS OF COVER CROPS

Cover crops are primarily used to slow erosion, improve soil health, enhance water availability, smother weeds, help control pests and diseases, and increase biodiversity.

IMPROVE SOIL FERTILITY

One of the greatest benefits of growing cover crops is improved soil fertility. The variety in plant species

THE BENEFITS OF COVER CROPS



Improve Soil Fertility



Increase Yield



Provide Pest Control

and growth pattern increases organic matter and carbon, and can even reduce the need for applied nitrogen.

According to the Ontario Ministry of Agriculture, Food and Rural Affairs, legume cover crops can fix nitrogen for a subsequent crop. In addition, some cover crop species are credited with cycling nutrients that have moved below the root zone of typical annual crops. Deep-rooted cover crops can bring nutrients and moisture up from deep in the soil.

PROVIDE PEST CONTROL

Cover crops can provide pest control by creating an inhospitable environment for certain pest species.

"Cover crops can help with weed control by reducing weed density and size", according to Successful Farming. "The cover takes its share of water, light, and nutrients, limiting weed size and reducing the amount of needed herbicide. Identifying the species of weed to control, and the timing of emergence and growth, are key elements of a weed control program, as is planting a cover that will produce adequate biomass."

INCREASE YIELD

Research shows that planting cover crops can increase your crop yield.

According to SARE's 2019-2020 National Cover Crop Survey, "In the face of relentless spring rain, cover crops helped many respondents plant earlier than they would have been able on conventionally managed fields. Though they did not garner as much of a yield benefit as would have been expected in a dry year, cover crop users still reported statistically significant yield increases in corn, wheat and soybeans."

Growing deep rooted cover crops creates pores and channels for water to infiltrate. This gives water a path into the soil, as opposed to running off, decreasing soil erosion and increasing plant available water held in the soil.

More than half of the horticulture respondents also reported that cover crops increased their profitability.

TIPS FOR CUTTING WEED PRESSURE USING COVER CROPS

PICK THE RIGHT SPECIES

Choosing the right cover crops to plant is the first step in reaping the benefits that they offer. Each cover crop has a different specialty or purpose and it is important to choose the right one for the required job.

According to Successful Farming, "Cereal rye, or winter rye varieties planted in cooler climates, helps break up hard soil and inhibits small weeds from developing. The tillage radish, or daikon radish, has a deep taproot that reaches nutrients otherwise lost to leaching. Hairy vetch is excellent for fixing nitrogen. Red clover as a clover cover crop is a nitrogen scavenger that makes for good grazing and insect habitat. Cover crop mixes work in concert to perform a variety of tasks."

USE A HIGH POPULATION

Once you've chosen the species you intend to plant, you want to plant them at a high enough population. The idea behind using a high population is that the bigger canopy you can develop the better, as weeds need sunlight to grow.

TERMINATE WITHOUT TILLING

As beneficial as cover crops are, killing them the right way and at the right time is critical. And that means without tillage. According to the United States Department of Agriculture, "Cover crops improve overall soil health by adding living roots to the soil during more months of the year and increasing organic matter in the soil. Tillage destroys all of those natural benefits."

Instead, producers can terminate cover crops with herbicides that are compatible with the spring-planted crop.

BE PATIENT

Cover crops offer numerous benefits, but it takes time to see those benefits. In some cases, cover crop benefits can be seen in the first year of use, but in other cases it may take three or more years to see results.

Always remember that cover crops are a long-term strategy. Soil quality, weed pressure, and crop yields won't improve overnight, but if you stick with it, you will surely see the benefits.

RESOURCES

AGRICULTURAL PESTS AROUND THE WORLD

<https://milkgenomics.org/article/first-farmers-come-go/>

<https://insectcop.net/most-common-agricultural-pests/>

<https://www.sciencedirect.com/topics/earth-and-planetary-sciences/agricultural-pest>

THE EFFECTS OF AGRICULTURAL PESTS

<https://blog.agrivi.com/post/how-to-deal-with-insect-pests>

<https://www.sciencedirect.com/topics/earth-and-planetary-sciences/integrated-pest-management>

CROP COMMODITY PRICES

<https://www.oecd.org/agriculture/>

<https://agriculture.canada.ca/en/canadas-agriculture-sectors/crops/reports-and-statistics-data-canadian-principal-field-crops/canada-outlook-principal-field-crops-2021-11-19>

<https://www.rayglen.com/grain-conversion-calculator/>

ENHANCING CROP YIELD YEAR OVER YEAR

<https://www.investopedia.com/terms/c/crop-yield.asp>

<https://www.nature.com/articles/s41586-019-1679-0>

<http://www.fertilizer.co.za/public-relations/news/2017/259-factors-that-influence-crop-yield>

<https://eos.com/blog/crop-yield-increase/>

USING CROP COVERS TO SOLVE WEED PROBLEMS

<https://www.sare.org/resources/cover-crops/>

http://www.omafra.gov.on.ca/english/crops/facts/cover_crops01/cover.htm

<https://www.agriculture.com/crops/cover-crops/cover-crops-offer-financial-and-environmental-benefits>

<https://www.farmprogress.com/cover-crops/5-tips-cutting-weed-pressure-cover-crops>

<https://www.nrcs.usda.gov/wps/portal/nrcs/ia/newsroom/features/STELPRDB1086071/>