
CropChoice\$ User Guide

Crop Planning Software Tool - Version 5.50



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You can read this guide on-line or download it from the CropChoice\$ web page. It is included in the CropChoice\$ software download file. You can also print it, although this limits its use in that you cannot open the links.

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Introduction to CropChoice\$ tool

CropChoice\$ is a crop planning software tool developed by Alberta Agriculture and Irrigation (AGI) to help you, as a grain, oilseed, pulse or special crop producer:

- Make better crop planning decisions
- Forecast revenues and margins for your crop enterprises
- Calculate the probabilities of achieving your forecasted results

CropChoice\$ helps you to make better management decisions about cropping enterprises by identifying, measuring and helping you to manage risks. CropChoice\$ also helps you evaluate risk management strategies such as changing the crop mix, buying crop insurance and negotiating land rental arrangements.

For more information about decision-making, see [page 16](#).

Important information about this release

CropChoice\$ (Version 5.50) is an update version from Version 5.40. It contains updates for 2023 crop insurance and 2023 crop budgets.

Existing data files (.crs files) can be loaded by Version 5.50, but the following additional steps **MUST** be followed if using earlier versions than 3.30:

- Immediately after loading a file from a previous version, enter township, range and meridian information. See Figure 1 below.

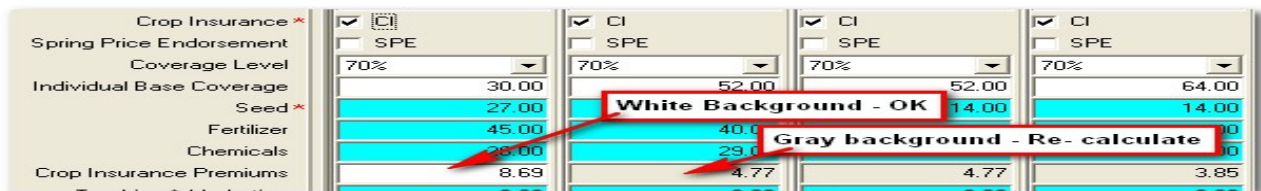
Caution: If you fail to enter the information above, before saving the file again, you will lose critical crop information.

Figure 1 Enter township, range and meridian information



For existing scenarios that include crop insurance, unclick and re-click the crop insurance selection boxes. This forces CropChoice\$ to recalculate insurance coverage levels and premiums. If you see gray backgrounds for individual base coverage and crop insurance premiums input cells, you must re-calculate these cells. See Figure 2 below.

Figure 2 Loading data files from previous versions



	CI	CI	CI	CI
Crop Insurance *	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Spring Price Endorsement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coverage Level	70%	70%	70%	70%
Individual Base Coverage	30.00	52.00	52.00	64.00
Seed *	27.00	40.00	14.00	14.00
Fertilizer	45.00	40.00	40.00	40.00
Chemicals	25.00	29.00	29.00	29.00
Crop Insurance Premiums	8.69	4.77	4.77	3.85

CropChoice\$ (Version 5.50) requires Windows 2000 or newer, including Windows 7, Windows 8, Windows 8.1 and Windows 10. CropChoice\$ is intended only for cropping operations in Alberta. See [page 17](#) (CropChoice\$ limitations) for more information.

This release of CropChoice\$ (Version 5.50) reflects Alberta crop costs, crop insurance premiums and crop insurance payouts for the 2023 cropping year.

For any questions, comments or suggestions, see the contact information at the front of this User Guide. Check AGI's website at alberta.ca/cropchoices-decision-making-tool for information about the most recent version.

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What's new in CropChoice\$ (Version 5.50)?

If you are familiar with earlier CropChoice\$ releases, Version 5.50 contains 2023 Agriculture Financial Services Corporation (AFSC) crop insurance data and 2023 crop budgets. It is important to note that Version 5.50 cannot be used to analyze the option of purchasing spring price endorsement (SPE) because effective March 15, 2021 AFSC announced that it no longer offers that program.

What does CropChoice\$ do that other crop planning tools do not?

Traditional crop planning tools use only single estimates of yields and prices. CropChoice\$ recognizes that future crop yields and prices cannot be known precisely. To reflect this, you enter yields and prices as three different values: worst possible, best possible and most likely. These varying inputs produce varying outputs which, in turn, give you a clearer and more accurate forecast than traditional linear budgets.

CropChoice\$ helps you to forecast expected yields and prices that lead to overall gross margins and measures the risk involved in the plan and evaluates the effects of potential risk management strategies. CropChoice\$ can handle the following:

- Up to 40 dry land and irrigated crops (depending on the entered location)
- Up to 32 fields
- Up to eight scenarios that directly compare and contrast the risks and returns of each

Quick tour for first-time users

If you are a first-time user of CropChoice\$, take a quick tour and see the highlights. CropChoice\$ will open to a welcome screen (see Figure 3) when it is used for the first time. To find information about CropChoice\$, follow the links on the screen. To go directly to the CropChoice\$ main input screen, click on "Start". The welcome screen can be turned off by checking the "Don't show this screen again" box.

Figure 3 CropChoice\$ welcome screen



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Once you have chosen “Start” from the welcome screen, the main input screen will appear. It shows two input columns with no input or default information. To open the demonstration file (see Figure 4), click on the “Open” button near the top left of the screen. Choose the file named Demonstration-March 2023.crs.

Figure 4 Main input screen (demonstration file)

Field Description	Field # 1	Field # 2
North Quarter	Smith Place	
Acres	160	100
Crops *	barley_feed	canola_arg
Stubble, Fallow or Irrigated	Stubble	Stubble
Unit	bushels	bushels
Worst Possible Yield/Acre *	20.0	20.0
Best Possible Yield/Acre	90.0	60.0
Most Likely Yield/Acre	80.0	45.0
Worst Possible Price *	6.50	16.00
Best Possible Price	8.50	18.50
Most Likely Price	7.50	17.50
Crop Insurance *	<input type="checkbox"/> CI	<input type="checkbox"/> CI
Spring Price Endorsement	<input type="checkbox"/> SPE (N/A)	<input type="checkbox"/> SPE (N/A)
Coverage Level		

Note: On this screen, the scenario number, description, township, range, meridian and soil zone are at the top, and various control buttons (or icons) are on the left. Information is already entered for the demonstration file (TWP36-R26-W4, Black soil zone). Yields and prices are entered for two demonstration fields of feed barley and Argentine canola.

You now have two options:

- Experiment with the demonstration file to get a better understanding of CropChoice\$
- Close the program, and re-open it to start a new analysis.

If you choose to work through the demonstration file, your numbers may not exactly match the numbers in this User Guide because of different program versions.

Plan your analysis

The CropChoice\$ (Version 5.50) design is field-based not crop-based. This means you enter data on a field-by-field basis, which is likely the same way you report records to AFSC.

Tips for entering data

- If you have more than 32 fields, you may have to combine some as a single-field entry. For example, multiple barley fields that have similar production capacity may have to be combined on one field entry. **Do not** consolidate all fields of the same crop into a single entry, as this may produce misleading results because of the variability of the fields.
- Working with individual fields allows you to separate owned land from rented land and crop share from cash rent. You can also assign different costing profiles to different fields.

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Create a base scenario

The recommended way to use CropChoice\$ is to create a base scenario that reflects your typical cropping plan, then test the effects of various risk management strategies by creating up to eight scenarios. Write a description for each scenario next to the Scenario # input cell (see Figure 5).

Choose township, range, meridian (TRM) and soil zone

First, choose the appropriate TRM and soil zone. These input cells are on the main input screen, at the top right. CropChoice\$ determines the soil zone automatically unless you change it manually.

TRM information determines the list of available crops, crop insurance coverage, premiums and payouts, and the way that various yields and prices correlate to each other. The soil zone determines default variable and fixed costs. The program automatically calculates a normal individual base coverage, which will not necessarily match individual average yields. To enter township, range, meridian, soil zone, crop yields and prices, and crop insurance (CI) information (see Figure 5).

Figure 5 Entering township, range, meridian, soil zone, yields, prices and CI information

The screenshot shows the CropChoice\$ software interface. At the top, there are buttons for 'Open' and 'Save', and the year '2023'. Below this, the 'Scenario #' is set to '2' and 'Base + CI'. A circled area highlights the 'Township: 36', 'Range: 26', 'Meridian: 4', and 'Soil Type: Black' fields. The main area displays a table for two fields: 'Field #1' (North Quarter) and 'Field #2' (Smith Place). The table includes columns for Acres, Crops, Stubble, Fallow or Irrigated, Unit, Worst Possible Yield/Acre, Best Possible Yield/Acre, Most Likely Yield/Acre, Worst Possible Price, Best Possible Price, Most Likely Price, Crop Insurance, and Spring Price Endorsement. The 'Crops' column shows 'barley_feed' for Field #1 and 'canola_arg' for Field #2. The 'Unit' column shows 'bushels' for both. The 'Worst Possible Price' column shows '6.50' for Field #1 and '16.00' for Field #2. The 'Best Possible Price' column shows '8.50' for Field #1 and '18.50' for Field #2. The 'Most Likely Price' column shows '7.50' for Field #1 and '17.50' for Field #2. The 'Crop Insurance' column shows 'CI' checked for both. The 'Spring Price Endorsement' column shows 'SPE (N/A)' for both. A note on the right side of the table states: 'Crop yields and prices' and 'Crop insurance Note SPE is not available because AFSC no longer offers this insurance.'

Field Description	Field #1	Field #2
North Quarter	Smith Place	
Acres	160	100
Crops *	barley_feed	canola_arg
Stubble, Fallow or Irrigated	Stubble	Stubble
Unit	bushels	bushels
Worst Possible Yield/Acre *	20.0	20.0
Best Possible Yield/Acre	90.0	60.0
Most Likely Yield/Acre	80.0	45.0
Worst Possible Price *	6.50	16.00
Best Possible Price	8.50	18.50
Most Likely Price	7.50	17.50
Crop Insurance *	<input checked="" type="checkbox"/> CI	<input checked="" type="checkbox"/> CI
Spring Price Endorsement	<input type="checkbox"/> SPE (N/A)	<input type="checkbox"/> SPE (N/A)
Coverage Level	70%	70%

Refer to your crop insurance statement or contact your AFSC district office for more precise information about your premium discounts and surcharges.

CropChoice\$ allows only one legal location for each analysis, so choose a location that represents your whole operation.

Refer to a soil zone map of Alberta for more soil zone information and its relationship to township, range and meridian. Click here or paste or type the following link into your internet browser:

<https://www1.agric.gov.ab.ca/soils/soils.nsf/soilgroupmap>.

Note: Once you have started an analysis, do not change the township, range, meridian or soil zone. These inputs are central to all of CropChoice\$ calculations and errors will occur if you change them in the middle of an analysis. To analyze a crop operation in another location, close the program and start again.

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Identify crops - stubble, fallow or irrigated (see Figure 5)

Next, identify the fields, number of acres and crop intentions. Choose stubble, fallow or irrigated, to determine the appropriate variable and fixed costs.

Note: Irrigated will appear as an option only in Alberta's irrigation areas. CropChoice\$ treats irrigated and dry land crops differently for crop insurance purposes; however, all premiums and payouts on dry land reflect stubble crops only.

Choose crops

Click on the crops input cell for a dropdown box with a list of crops available in the indicated township, range and meridian. Select the crop to be grown in each field.

Check units

Depending on the crops you select, bushels, pounds or tonnes will appear. You cannot change the units. When you enter yields, prices and other information, pay close attention to the unit assigned to each crop. Serious errors occur if inputs are based on bushels when they are supposed to be in pounds (e.g., chickpeas, beans and other crops are measured in pounds, not bushels).

Malt vs. feed barley

CropChoice\$ has a unique feature to deal with the issue of growing high-yielding/lower-value feed barley or low-yielding/higher-value malt barley. A complicating factor is that malting companies do not always accept barley grown for malting purposes. CropChoice\$ allows for the chance that barley grown for malt may not be accepted.

When you select malt barley from the crops dropdown box, the malt barley prices screen appears. Once you have completed this screen, you can use it as a template for other malt barley fields. CropChoice\$ simulates malt barley yield just like other crops, but the malt price is calculated according to what you specify as the chance of getting malt.

The example in Figure 6 below specifies a 30 per cent chance of getting malt. This feature allows you to analyze and directly compare the economics and risk implications of growing malt barley versus feed barley for individual situations.

Figure 6 Malt vs. feed barley

The screenshot shows the CropChoice\$ software interface. The main window displays a table of field data for 'Demonstration-March 2023'. The table has columns for Field #1, Field #2, and Add field #3 through #5. Field #1 is 'North Quarter' (160 acres) and Field #2 is 'Smith Place' (100 acres). Both fields are currently set to 'barley_malt' and 'Stubble' with units of 'bushels'. A 'Malt Barley Prices' dialog box is open, showing a comparison between Malt barley and Feed barley. The dialog box includes a '% chance of malt' slider set to 30% and a 'Close' button.

	Malt barley	Feed barley
Worst possible price	7.50	6.50
Best possible price	10.00	8.50
Most likely price	8.50	7.50

% chance of malt : 30

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Crop yields and prices (see Figure 5)

Caution: This is a critical point in the analysis. Take great care when you enter data. For each crop, enter your estimate of the worst possible, best possible and most likely yields and prices. These three values represent your individual experience and knowledge about the ability of your farm to produce a crop, and the best information available about prices.

The best method of framing your estimates is by stating, “I would be very surprised if the yield were lower than”. In the barley example in Figure 5, the worst possible yield estimate is 20 bushels/acre.

Continue this process of estimating worst possible, best possible and most likely for other prices and yields for every crop. To prevent a crop’s yield or price from varying, simply enter the same yield for all three estimates (worst, best and most likely). You may need a single price, for example, when your production is already contracted or hedged and, therefore, you already know the price you will get.

Crop insurance (see Figure 5)

When you choose crop insurance, CropChoice\$ calculates the premium automatically based on location, crop and coverage level. Your choice of crop insurance then applies to all fields growing the same type of crop. For example, if you choose two fields of feed barley, then crop insurance applies to both fields. This is consistent with crop insurance policy.

Note: AFSC does not distinguish between Argentine canola and Polish canola, but CropChoice\$ treats them as two different crops. For example, if you choose to insure Argentine canola, then you manually have to make the same choice for Polish canola. A similar situation exists for legume, grass and mixed hay.

If you choose crop insurance, the coverage level defaults to 70 per cent, but 50, 60 or 80 per cent levels are also available. As alluded to previously, SPE which is only an option if you select crop insurance is no longer being offered as an insurance product by AFSC.

If you choose an option for which no crop insurance contract is available, then a warning message “CropChoice\$ does not support this combination of crop insurance option” pops up, and the premium shows as zero. If the premium appears as zero, then crop insurance is not available for that coverage level or crop in the selected area. A warning message will pop up to suggest choosing a different crop insurance option.

If you are an AFSC customer, use your own coverage levels and premiums because it reflects your crop insurance experience and claims history for each crop type you grow. Discounts and surcharges may cause your premiums to vary by more than 30 per cent. It is critical that you get this information from your crop insurance statements or from your district crop insurance office.

Note: The 2023 crop insurance coverage price for potatoes and sugar beets was unavailable when Version 5.50 was released. As a result, the 2022 price was used. This may affect your crop plan results, but it is expected to give a reasonable approximation of insured plans.

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Variable costs (see Figure 7)

CropChoice\$ automatically enters default costing information based on soil zone, crop type and cultivation practice. Default costs are based on AGI's cropping alternatives budgets and data collected by the AgriProfit\$ Business Analysis and Research Program.

Figure 7 Variable costs, land rental and cash fixed costs

Field Description	Field # 1	Field # 2
North Quarter	Smith Place	
Acres	160	100
Crops *	barley_feed	canola_arg
Stubble, Fallow or Irrigated	Stubble	Stubble
Unit	bushels	bushels
Worst Possible Yield/Acre *	20.0	20.0
Best Possible Yield/Acre	90.0	60.0
Most Likely Yield/Acre	80.0	45.0
Worst Possible Price *	6.50	16.00
Best Possible Price	8.50	18.50
Most Likely Price	7.50	17.50
Crop Insurance *	<input type="checkbox"/> CI	<input type="checkbox"/> CI
Spring Price Endorsement	<input type="checkbox"/> SPE (N/A)	<input type="checkbox"/> SPE (N/A)
Coverage Level		
Individual Base Coverage *		
Seed *	33.05	71.60
Fertilizer	162.65	228.90
Chemicals	40.55	41.80
Crop Insurance Premiums		
Trucking & Marketing	22.20	12.15
Fuel, Oil & Lube	30.55	30.55
Irrigation Fuel & Electricity	0.00	0.00
Repairs - Machinery	17.70	18.25
Repairs - Buildings	1.30	1.30
Utilities & Misc. Expenses	22.60	27.55
Custom Work & Specialized Labour	4.70	7.00
Operating Interest Paid	20.85	28.60
Paid Labour & Benefits	13.10	13.10
Unpaid Labour	11.35	11.35
Total Variable Costs	390.60	492.15
Cash Rent *	60.00	60.00
or Share Crop - Land Owner %		
Seed/Fert/Chem - Land Owner %		
or \$/acre		
Owner's Other Exp.\$/acre		
Taxes, Water Rates, Lic	8.55	8.55
Paid Capital Interest	16.25	16.25
Fixed Cash Costs	84.80	84.80

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If the variable cost column is blank after you select a crop and a cultivation practice, then no default information is available. Both paid and unpaid labour are included in the variable costs.

Note: Do not base cropping decisions for your farm operation solely on the default information provided. Review the numbers in CropChoice\$ carefully and update them with your cropping and financial records.

For CropChoice\$ (Version 5.50), when you add additional fields of the same crop, CropChoice\$ will copy the cost profile from the first field you entered. Customized crop insurance coverage levels and premiums are also copied. Spend time customizing costs for the first field of each crop so that additional fields will reflect your changes.

Land rental ([see Figure 7](#))

Enter the details of land rental arrangements in the appropriate section near the bottom of the main input screen, either cash rent or crop share.

Crop share rent is calculated as a percentage of gross revenue. In a share crop situation, if the landlord pays a portion of the seed, fertilizer and chemical, enter that portion as a percentage. If the share crop arrangement is more complicated, estimate the landlord's share of costs in dollars and enter it in the row titled "or \$/acre". The landlord's share of costs (Seed/Fert/Chem% or \$/acre) is calculated into the net rental paid under cash fixed costs.

In all share crop situations, assume that the landlord contributes a portion of crop insurance premiums and receives the same portion of any payouts. CropChoice\$ assumes the landlord cannot lose money; therefore, the landlord's share of the crop is never lower than zero. The Tenant's Other Exp. \$/acre can be used for additional fixed costs over and above the crop share (e.g., fencing, taxes, water rates, etc. paid by the tenant).

Cash fixed costs

CropChoice\$ supplies default figures for cash fixed costs but review and update these figures to reflect your own numbers. It is unlikely to have taxes on rented land, but there may be capital interest on machinery. Click the "Input Data Preview" button to view a complete record of all input information for each scenario. Click the "Print" button at the top of the screen to print a copy.

Save your work

Click the "Save" button at the top left side of the main input screen to save your work. A Windows screen will appear to name and save the file in your usual way.

When you exit, CropChoice\$ asks, "Do you want to save the input data? If Yes, then the same Windows screen will appear. If No, then CropChoice\$ will close and the data will not be saved. Click "Cancel" to return to the program.

This process can create, name and save any number of CropChoice\$ files. To open a previously saved file, click the "Open" button at the top of the main input screen and select the file.

Run simulations

Once input information is entered for the first scenario, CropChoice\$ must run a simulation before the analysis is complete. Click the "Run Simulation" button on the left side of the screen. After a few seconds, the Scenario Analysis screen will appear.

If you are working through the demonstration file, click the "Run Simulation" button to see the type of data you get. This process is explained thoroughly in the Monte Carlo Simulation, see [page 19](#). For more information on interpreting CropChoice\$ reports, see the section on interpreting CropChoice\$ graphs, tables and reports.

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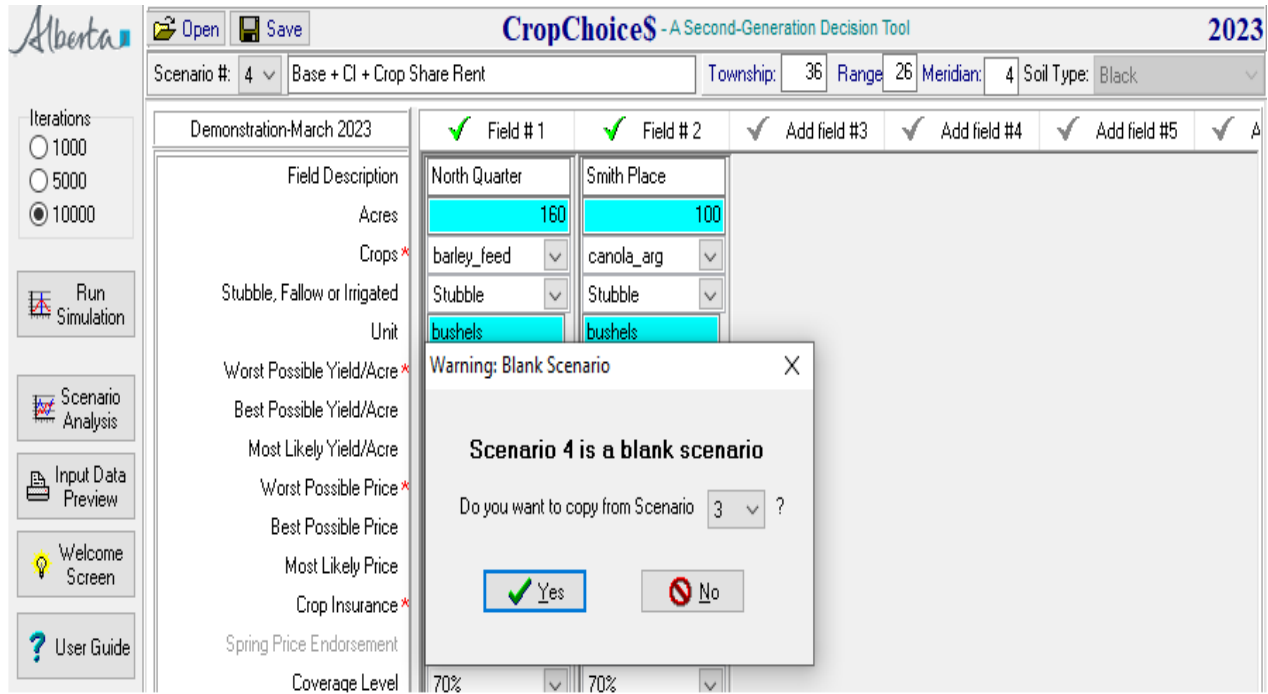
Number of iterations and computer capacity

If your computer takes more than one minute to perform a simulation, try reducing the number of iterations (repetitions) to 1,000 (top left of the main input screen, see Figure 7). Some computers can experiment with a larger number of iterations. In general, more iterations produces a more accurate and repeatable analysis. For more information, see the section Monte Carlo Simulation (page 19).

Additional scenarios

CropChoice\$ performs scenario analysis. Up to eight different sets of inputs can be created and saved, simulations run and comparisons made. The ability to compare multiple scenarios against a base scenario is what makes CropChoice\$ analyses extremely valuable (see Figure 8).

Figure 8 Creating a new scenario



To create additional scenarios, go to the main input screen, click on the Scenario # drop-down box and choose the next number. To copy the inputs from a previous scenario just follow the instructions as they appear.

- Create new scenarios by making changes such as varying the crop mix, adding acres, adjusting crop insurance choices or switching to alternate land rental options. Name the scenario appropriately.
- Run a simulation for the new scenario by clicking on the “Run Simulation” button at the top left of the main input screen. The scenario analysis screen appears after each simulation.

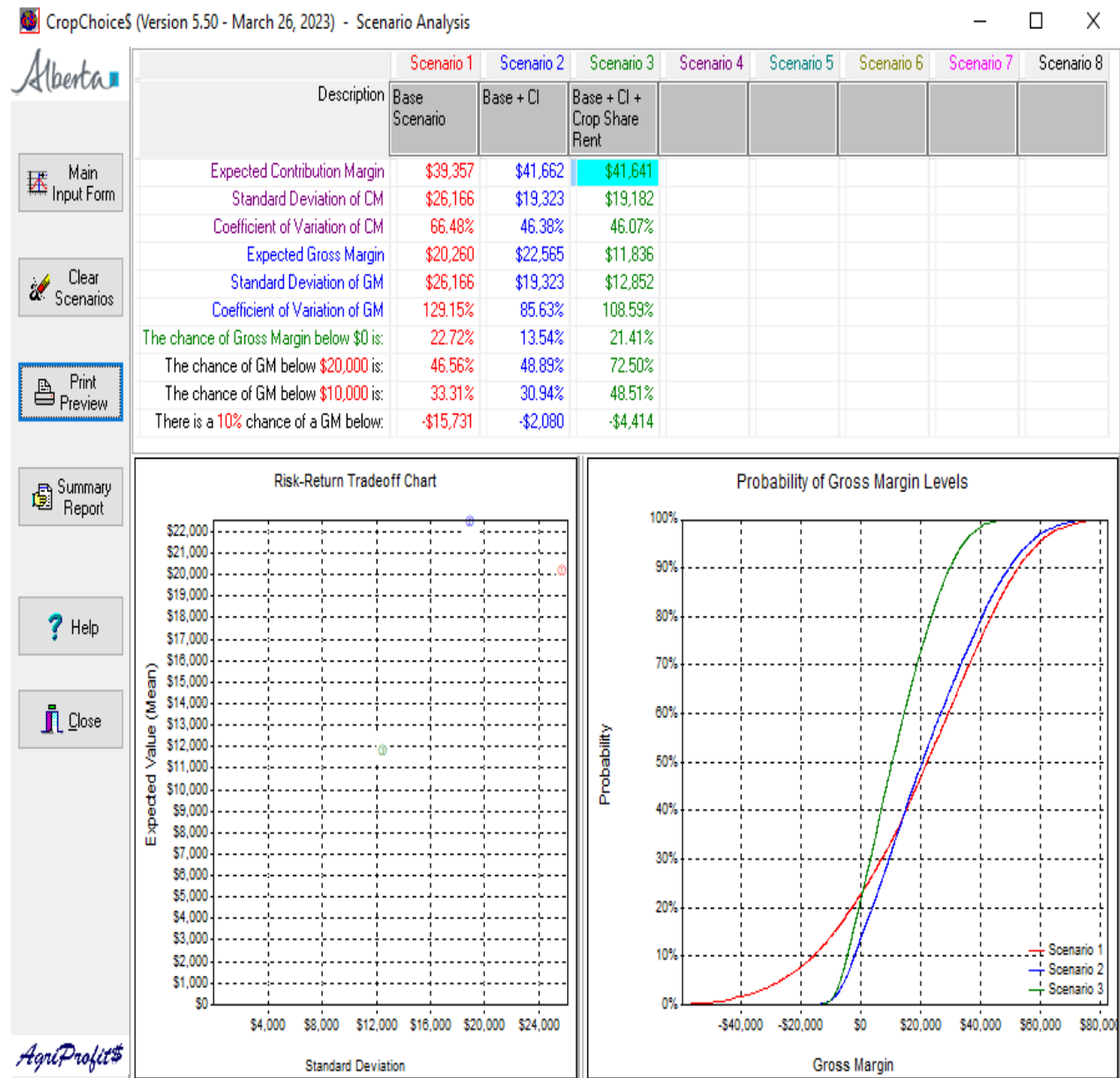
The demonstration file has three scenarios already entered:

- Scenario #1 - Base Scenario (Base)
- Scenario #2 - Base plus Crop Insurance (Base + CI)
- Scenario #3 - Base plus CI and Crop Share Rent (Base + CI + CSR).

Figure 9 shows simulation results for all three scenarios. If you are working through the demonstration file, click on the “Run Simulation” button to see the three scenarios.

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Figure 9 Scenario analysis screen



Scenario analysis screen

This screen shows important information about the scenarios created. Results are displayed in two different graphs and in the table at the top of the page. This gives you the ability to:

- Create up to eight new scenarios and run simulations for each
- Update or replace existing scenarios simply by making the required changes and re-running the simulation

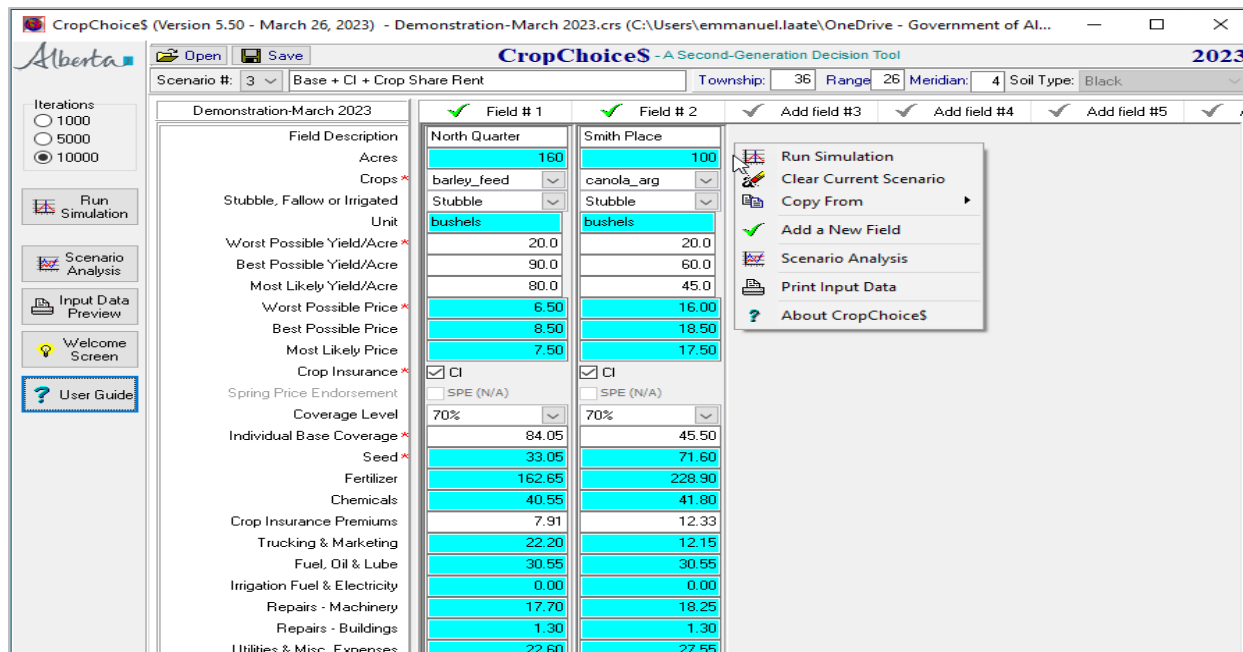
Two to four scenarios work best. The graphs can be confusing if there are too many scenarios.

Clearing inputs and scenarios

To delete or clear inputs from individual scenarios, right-click the mouse on the main input screen and choose “Clear Current Scenario” (see Figure 10). This clears the current scenario’s input data and description but does not clear the scenario analysis screen.

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Figure 10 Clearing current scenario



The “Clear Current Scenario” feature works best when you are entering new input information and re-running the scenario. This ensures that all CropChoice\$ reports reflect current information.

Note: Do not run simulations out of sequence or run simulations when one scenario has been cleared and not replaced. For example, if there are four scenarios and Scenario #2 is cleared and left blank, the simulation will not run properly.

To clear the scenario analysis screen, click on the “Clear Scenarios” icon. This clears all reports, tables and graphs but leaves scenario inputs and descriptions in place.

To delete a field from the main input screen, click on the Field # at the top of the column.

Caution: CropChoice\$ will delete the chosen field and ALL fields to the right.

Interpret CropChoice\$ graphs, tables and reports

CropChoice\$ reports key information as ranges of numbers and probabilities rather than individual values. Graphs and tables best present this information.

The scenario analysis screen and report (see Figure 9)

This screen is the main source of CropChoice\$ output information. It presents key information from all scenarios in two graphs and a table.

Probability of gross margin levels graph (see Figure 9)

The graph on the lower right of the scenario analysis screen shows the chances of reaching any specific gross margin level. This graph compares scenarios and the effects of the various risk management strategies.

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Risk – return tradeoff chart


The graph on the left side of the scenario analysis screen plots expected values and standard deviations (a statistical measure of risk) for gross margins (see principles behind CropChoice\$ on [page 18](#) for more information). A scenario that plots above and to the left has the highest expected gross margin and the lowest standard deviation.

Information table

The table at the top of the scenario analysis screen (see [Figure 9](#)) presents the same information, but in a different way. You are presented with expected contribution margin, gross margin and their standard deviations for each scenario, making it relatively easy for you to compare the scenarios.

The ability to set individual targets for gross margin (GM) is an important feature of this table. Type in any value for gross margin and the probabilities of failing to reach that level are automatically calculated for all scenarios (see [Figure 11](#)). If you are forecasting the per cent chance of incurring a significant loss, consider entering a negative gross margin target. Figure 11 uses -\$25,000 and -\$15,000.

Figure 11 Setting user-defined targets for gross margin

 Print Preview	The chance of Gross Margin below \$0 is:	22.72%	13.54%	21.41%
	The chance of GM below \$25,000 is:	53.93%	57.32%	82.40%
	The chance of GM below \$15,000 is:	39.79%	40.05%	61.09%
	There is a 10% chance of a GM below:	-\$15,731	-\$2,080	-\$4,414

View the scenario analysis screen report by clicking on the print preview icon on the left of the screen. Print a copy by clicking on the “Print” button.

Summary report

To view or print a complete summary of all scenarios in a report format, click the “Summary Report” button on the scenario analysis screen. This report is a compilation of individual scenario analysis reports without graphs.

Using CropChoice\$ to make better management decisions

The purpose of this software is to help you make better financial and economic decisions on your cropping enterprises. One strategy might be to produce the highest profit, but still maintain an acceptable level of risk, while another strategy might be to take on the lowest possible risk while still earning a positive return. There is usually a risk-return tradeoff. In general, higher return strategies are riskier than lower return strategies.

CropChoice\$ only deals with financial and economic implications for an individual cropping enterprise, so there are many more issues to consider. For example, is there also a significant livestock enterprise or off-farm income? These revenue sources are not considered in CropChoice\$ and may provide significant risk reduction.

CropChoice\$ is not designed to provide an exact answer, but it is designed to evaluate risk management strategies for individual cropping enterprise within the farm business as a whole. In conventional crop planning analyses, there is generally only one choice: the scenario that gives the highest expected return. The problem, however, is that conventional analyses usually do not consider risk, whereas CropChoice\$ does consider risk. When you make decisions using CropChoice\$, consider the steps described below.

Decision-making steps

Step 1. Build a base scenario

Choose individual crops and the number of acres to grow based on contribution margin (CM). For the demonstration file, Scenario #1, click the “Input Data Preview” icon. At the bottom of this report, contribution margin (CM) is listed for each individual crop.

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In this case, Argentine canola has a CM of \$234.37 and feed barley is \$99.48 (the numbers may vary slightly because of the simulation process and program version differences). Therefore, including as much canola as field rotations would allow looks more lucrative. If the fields involved are on rented land, the gross margin may come into play.

Gross margin is cash revenues minus cash expenses (see the section, [The Principles Behind CropChoice\\$ page 18](#)).

Step 2. Try some risk management strategies

Once you have chosen an initial crop mix and designed a base scenario, it is time to look at some risk management strategies. Play around with crop insurance, different crop mixes or alternate rental arrangements to devise scenarios that forecast similar gross margins but with less risk. Once you have done this, it is time to make some decisions that consider risk as well as expected return.

Step 3. Apply decision rules

Use the information in CropChoice\$ tables and graphs ([see Figure 9](#)) to choose the scenario that best fits your situation and your attitude toward risk. Here is one of many strategies (remember that numbers may not exactly match the numbers below):

- Choose the scenario with the best expected gross margin. For the demonstration file, it is Scenario #2.
- Ask yourself if other scenarios offer a similar gross margin with lower risk. On the risk-return tradeoff chart (Figure 9), is there another scenario that would offer a similar positive gross margin with lower risk compared to Scenario #2? The answer is yes since Scenario #3 is below and to the left of both Scenarios #2 and Scenarios #1.
- Choose some level of total gross margin that is important to you and your business. It might be breakeven, some negative amount representing a financial disaster or a positive amount that reflects your annual cash commitments. In the demonstration file, (Figure 9, second-last line) has been set at -\$10,000. Does another scenario have a lower chance of losing \$10,000 or more? The answer is “No”. Scenario #2, the scenario with the best expected gross margin has a 30.94 per cent chance of losing \$10,000 or more, the lowest of all scenarios. This is sometimes called a “safety first” rule or the concept of “value at risk.”
- Look at the probability of gross margin levels graph (Figure 9). In this example, Scenario #3 has the least amount of variation.

In the example above, Scenario #2 may be preferable since it has the greatest expected gross margin and the smallest coefficient of variation of gross margin when compared to the other Scenarios. Scenario #3 has the lowest standard deviation of gross margin (less variation), however, its coefficient of variation which measures the ratio of the standard deviation to the expected gross margin is slightly higher than Scenario #2. Depending on your individual target for gross margin and attitude toward risk you would choose either Scenario #2 or Scenario #3.

Note: As illustrated in this discussion, decisions that consider risk are not as simple as those that do not. Your own decisions may not be as clear as in the demonstration file; however, if you follow a well thought out set of decision rules, you are more likely to make better management decisions.

CropChoice\$ Limitations

CropChoice\$ is designed to perform certain functions but be aware that there are the following limitations to CropChoice\$.

Limited to Alberta

CropChoice\$ formulas and calculations are based on yields and prices from real Alberta farms. AFSC provides crop insurance premiums and coverage levels; therefore, CropChoice\$ should not be used for financial forecasting outside Alberta.

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Catastrophic events

CropChoice\$ does not deal with catastrophic events such as total crop failure. CropChoice\$ tends to underestimate the value of crop insurance. For example, the three-point yield and price estimates should be framed as, “I would be very surprised if my yield were lower than 20 bushels of barley”. CropChoice\$ would then rule out barley yields below 20 bushels. However, catastrophic events (such as major hailstorms or drought) can cause near-total crop failures.

CropChoice\$ is designed to calculate the risk to the cropping enterprise *within the yield and price parameters that are provided*. It cannot evaluate the probability or the impact of a catastrophic event. When you evaluate risk management strategies, consider the ability of crop insurance to cover these infrequent events, even though CropChoice\$ does not consider them.

Uses estimates for some crops

Correlation coefficients for certain crops are based on estimates because historical information about the relationship of these crops to others is limited. For example, if you select chickpeas, a warning message appears, “Information about this crop is scarce, and estimates have been used. Scenarios that include large acreages may not be reliable. See User Guide for more information.” To minimize any problems, ensure these crops make up only a small proportion of the total crop acres. For more information about correlations, see the principles behind CropChoice\$ section ([page 18](#)).

Crops and farm enterprises

CropChoice\$ does not handle all crops or farm enterprises. Version 5.50 includes 40 dry land and irrigated cereals, oilseeds, pulses, forages and special crops. If a crop mix contains a crop that is not included in CropChoice\$, consider replacing it with a similar crop. For example, canola might be a reasonable stand-in for safflower.

Substitution can be useful but be careful to use this strategy for only a small proportion of crop acres; otherwise, the analysis could be misleading.

CropChoice\$ does not handle other enterprises, such as livestock.

Whole-farm projections

CropChoice\$ does not consider balance sheet information or non-cash fixed costs such as depreciation. CropChoice\$ cannot be used to make whole-farm projections because it deals with the cropping enterprise only. However, where cropping represents a significant part of an operation’s total revenue, the CropChoice\$ analysis may help make a better whole-farm assessment.

AgriStability and AgrilInvest

CropChoice\$ does not deal with AgriStability and AgrilInvest. Crop planning is typically an annual task, whereas AgriStability and AgrilInvest should be considered over a multi-year period.

Principles behind CropChoice\$

This section helps you understand how CropChoice\$ works and some of the background information used for the calculations.

CropChoice\$ adds risk and risk management to traditional crop planning and budgeting. CropChoice\$ uses three estimates for yields and prices (worst possible, best possible and most likely) for all crops. Outputs such as gross margin must also vary if yields and prices vary. CropChoice\$ calculates these outputs and presents them in several formats. The calculations are done using a process known as Monte Carlo Simulation.

This software starts to identify, measure and manage the risk associated with the cropping enterprise. Principles and techniques used in CropChoice\$ are described below.

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Triangular distribution

CropChoice\$ uses a three-point estimate to describe how crop yields and prices vary. In the main input screen, users enter worst possible, best possible and most likely values (for prices and yields) for each crop. This is all it takes to calculate a triangular distribution that describes variable inputs in statistical and mathematical terms. The mean, standard deviation and other statistical measures are calculated from this distribution. The seemingly simple inputs reflect real-world knowledge and experience growing and marketing crops. This information has tremendous analytical value.

Contribution margin and gross margin

Contribution margin and gross margin are closely related concepts. Contribution margin is the best single indicator of profitability at the individual field level. In terms of economics, it is the first choice-point in selecting crops for the farm plan.

Contribution margin is defined as total revenue minus total variable costs.

$$\text{Total Revenue} - \text{Total Variable Costs} = \text{Contribution Margin}$$

Gross margin is defined as total cash revenues minus total cash expenses.

$$\text{Total Cash Revenues} - \text{Total Cash Expenses} = \text{Gross Margin}$$

Since CropChoice\$ assumes that all revenues are cash, the only differences between contribution margin and gross margin are non-cash variable costs and cash fixed costs:

- Unpaid labour is included in the contribution margin calculation because it is a variable cost. Unpaid labour is excluded from gross margin because it is not a cash cost.
- Cash fixed costs include land rent (cash and share crop), taxes, water rights, licenses and capital interest. Fixed costs are included in the gross margin calculation because they are a cash cost. Fixed costs are excluded from the contribution margin.

In summary, contribution margin is valuable when choosing the most profitable long-term crop mix. Gross margin is a valuable indicator of the cropping enterprise's ability to generate cash flow annually.

Mean and standard deviation

Mean and standard deviation are statistical terms that describe the variability of a series of values.

- The mean, or simple average, is the total of all the values divided by the number of values. In CropChoice\$, the mean is also an "expected" value (i.e., expected contribution margin).
- Standard deviation is a measure of how far individual values vary from the mean. In CropChoice\$, standard deviation is a measure of risk. Higher standard deviation values indicate more variability or more risk.

The mean and standard deviations must be considered together. Standard deviations are not comparable unless they have the same base. Standard deviations of contribution margin per acre are directly comparable, but standard deviations of crop yields are not directly comparable.

The mean and standard deviation relationship becomes clearer in the risk-return tradeoff chart on the scenario analysis screen. See the discussion in the interpreting CropChoice\$ graphs, tables and reports section [page 15](#).

Monte Carlo Simulation

Monte Carlo Simulation is a mathematical and statistical technique that calculates probabilities for a complete range of expected values. One of the first uses of Monte Carlo Simulation was to evaluate battle strategies during the Second World War. Computers and specialized software make this type of programming available for projects such as CropChoice\$.

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The original CropChoice\$ prototype was created using Microsoft Excel and the @RISK add-in. AGI specialists created the public-release versions using Delphi software. CropChoice\$ Monte Carlo technique uses the triangular distributions for all crop yields and prices. Accounting for the correlations among crop yields and prices, these distributions are randomly sampled.

Consider the two-crop demonstration in this User Guide. CropChoice\$ samples each distribution by randomly choosing one yield and one price for barley and canola when the “Run Simulation” button is clicked. The choices might be 90 bushels at \$4 for feed barley and 60 bushels at \$10 for canola. Since yields and prices are the only varying inputs, the computer can calculate a complete set of outputs based on the sample. Iteration is the repeated recording of the results 1,000 to 10,000 times.

The computer tracks the data and produces the results in CropChoice\$ output screens. The iteration process is why results are not exactly the same when running identical scenarios multiple times.

Yield and price correlations

Twenty years of yield and price data determine the correlation coefficients for all CropChoice\$ crops. One complicating factor is that neither crop yields nor prices vary independently. For example, if barley yields are high, then wheat yields are also likely to be high; barley and wheat yields are strongly positively correlated.

A lower correlation coefficient means there is a better chance that when the yield of one crop is low, the yield of the other crop will be high, thereby reducing variability. As the cropping plan is built, CropChoice\$ selects the appropriate price and yield correlations and incorporates these concepts into the overall calculations for contribution and gross margins.

Troubleshooting

Problem	Possible Causes	Solutions
Simulation will not run	Only one field defined on main input form	CropChoice\$ needs at least two fields
	One or more input cells blank	Make sure all inputs cells are completed
Simulation takes too long	When 15+ fields are used or crop insurance is selected, the simulations take much longer to run	Select 1,000 iterations Run simulations when the computer can be left for an extended period Group fields of the same crop in the same location together. Warning – grouping <i>all</i> fields of the same crop may produce misleading results
Program takes too long to load (after clicking on the CC\$ icon)	This is normal, especially with older computers. Some of CropChoice\$ internal files have become very large due to crop insurance changes.	Wait for the program to load (older computers may take several minutes). Do not click more than once, this will open several CropChoice\$ windows at the same time
Simulation runs, but Probability of Gross Margin graph does not appear	<i>Worst possible, best possible and most likely</i> prices for all fields are the same	Make sure that yields and prices are entered correctly
	Simulations are run out of order	Simulations must be run in order (Scenario #3 cannot be run unless #1 and #2 have been run first)
Crop information did not save when using a data file from a previous version	Did not enter township, range and meridian information	After loading a file from a previous version of CropChoice\$, ENTER your township, range and meridian information before saving the file in the new version of CropChoice\$
Insurance coverage levels do not calculate correctly when using a previous version data file	Gray backgrounds for input cells indicate that cells need to be recalculated	Unclick and re-click the crop insurance selection boxes to recalculate insurance coverage levels and premiums
In the crops cell, crop options do not appear	Did not enter township, range and meridian information	Entering a valid township, range and meridian will display crops grown in that area.

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