

**Rainwater Harvesting Tank Size Calculator User Guide**  
**KC Farm School at Gibbs Road**

Ver 1.

This document is a user guide for a spreadsheet calculator created to size rainwater harvesting (RWH) tanks for farm and garden use. It was developed for a high tunnel but can be adapted for other similar uses.

The first half of this document explains each section of spreadsheet and how to use it. The second half shows an example application.

### **1. Workbook Description and Use**

The workbook contains three sheets:

1. Rainwater harvesting calculator for one year of rainfall data
2. The same rainwater harvesting calculator but extended for two years of rainfall data
3. Historical rainfall averages for cities in Missouri, Kansas, Nebraska, and Iowa

#### **Rainwater Harvesting Calculator (Sheets 1 and 2)**

The spreadsheet was set up to help size tanks for a rainwater harvesting system on a high tunnel. It calculates how much rain can be collected from the tunnel roof, compares that to the monthly amount of water used for irrigation, and calculates the month-to-month water volume in a storage tank. That helps to size a storage tank to save water from wet months and carry it over to dry months.

The calculator was created for a high tunnel – collect rain from the roof and use it inside the tunnel. But it can be adapted for other uses by adjusting the roof area where rain is being collected or the area of irrigation where the water is to be used.

The user needs to enter the following information:

- Roof dimensions for collecting rain
- Tank size
- Area to irrigate and weekly watering rate
- Local monthly rainfall

Yellow cells on the spreadsheet highlight where user information is entered.

Each section of the spreadsheet is described below.

#### **1. High Tunnel Size**

Enter the length and width of the high tunnel to calculate the roof area available to collect rain. If you will only have a gutter on one side of the tunnel, use half the width. If you are collecting water from another roof such as a building, enter those dimensions.

The roof area in square feet is calculated from the length x width. One inch of rain falling on 1 square foot produces 0.62 gallons of water.

## 2. Tank Size

Enter the size (gallons) of your storage tank or pond in this section.

## 3. Water Use in the Planting Beds

This section is used to calculate your monthly water use for irrigation.

### 3A. Planting Bed Area

Enter the number of planting beds, plus the length and width of each one to calculate the total area that is irrigated.

### 3B. Weekly Irrigation Rate + How Much Water You Use Each Month

For each month, enter how many inches of water you irrigate each week. The default irrigation rates in the table are 0.5"/week in winter, 1"/week in spring and fall, and 1.5" week in summer.

Water use is calculated from the Planting Bed Area multiplied by the weekly irrigation rate. Again, 1 inch of water x 1 square foot = 0.62 gallons.

**Formula:** Square feet (SF) of irrigated bed area x inches/week of water x 0.62 gallon/SF per inch x weeks/month = gallons/month of water used.

If you know how much water you use each month, you can overwrite the formulas to enter those numbers.

## 4. Monthly Rainfall and Volume of Rainwater You Can Collect

Enter the monthly rainfall amounts from the location nearest you. The default values in the spreadsheet are the long-term averages for Kansas City, Missouri. Historical rainfall averages for a number of Midwest cities are contained on the third sheet in the workbook.

Rainfall records are available from the National Weather Service at:

<https://www.weather.gov/wrh/climate>

On that page you will see a map of the U.S. with regional weather forecast offices. Click on your region and it will take you to a page with NOAA Online Weather Data (NOWData). You can access historical records from that location.

See the next page for screenshots from the National Weather Service website.

Local forecast by "City, St" or ZIP code  
 Enter location ...   
[Location Help](#)

**Dangerous Heat in the West; Coastal Flooding & High Rip Current Risk through the Weekend on the East Coast; Flash Flooding Concerns in the Southeast and Southwest**

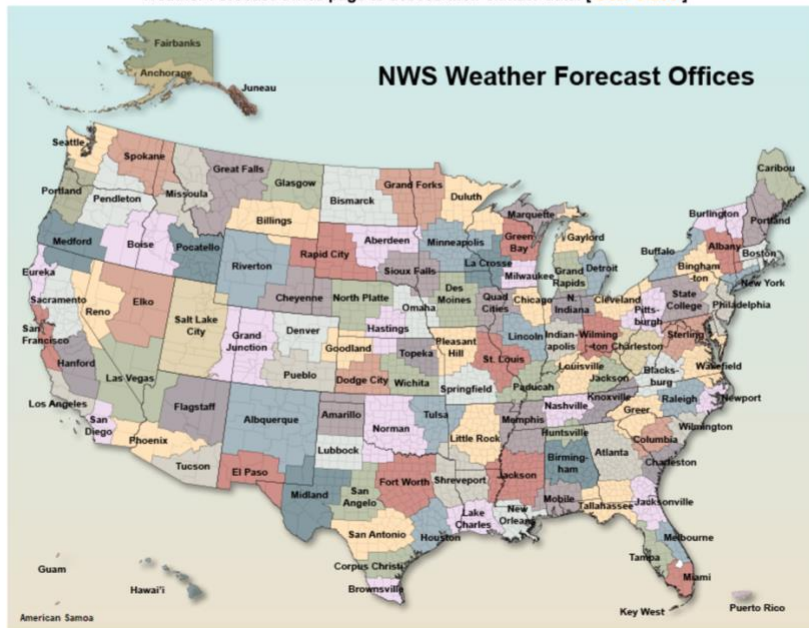
A dangerous, record heat wave continues across portions of the West through Tuesday. High rip current risk and dangerous surf continue through the weekend. There are flash flooding concerns through the weekend for portions of the Southeast and Southwest. [Read More >](#)

**Climate**  
 Weather.gov > Climate

**National Weather Service**  
 National Headquarters

For the latest climate forecasts see the [Climate Prediction Center \(CPC\)](#) web page.

The map below is your portal to NWS Climate information. Select an area of interest and you will be directed to the local Weather Forecast Office page to access their climate data. [ [User Video](#) ]



Having trouble navigating this site? Please have a look at this [short video](#) for a quick tour.  
 To learn about the functionality and datasets included in NOWData, please see this [training module](#).  
 If you have questions or need to contact us, please see our [FAQ](#)

**NOWData - NOAA Online Weather Data**

1. Location »	2. Product »	3. Options »	4. View »
<a href="#">View map</a> Concordia Area Topeka Area Abilene, KS Belleville, KS Clay Center, KS Clinton Lake, KS Concordia, KS Council Grove Lk, KS Courtland, KS Emporia 3 NW, KS	<input type="radio"/> Daily data for a month <input type="radio"/> Daily almanac <input checked="" type="radio"/> Monthly summarized data <input type="radio"/> Calendar day summaries <input type="radio"/> Daily/monthly normals <input type="radio"/> Climatology for a day <input type="radio"/> First/last dates <input type="radio"/> Temperature graphs <input type="radio"/> Accumulation graphs	Year range: 2000 - 2025 <input type="button" value="Go"/> Variable: <input type="text" value="Precipitation"/> Summary: <input type="text" value="Sum"/>	
<b>Product Description:</b> MONTHLY SUMMARIZED DATA - calculates averages, totals, daily extremes or frequencies for the selected variable for each month of the year for the selected range of years. Note: trace precipitation/snowfall/snow depth amounts are treated as zero in sums, mean, and number of days counts. Annual average temperatures are the average of the twelve monthly values. Temperatures are reported in degrees F; precipitation, snowfall and snow		- Common questions - Powered by <b>ACIS</b> NOAA Regional Climate Centers	
The Applied Climate Information System (ACIS) is a joint project of the Regional Climate Centers, the National Centers for Environmental Information (NCEI) and the National Weather Service. Official data and data for additional locations are available from the Regional Climate Centers and NCEI.			

The table in Section 4 calculates how much water you can collect based on the roof area x the monthly rainfall.

**Formula:** Tunnel roof area (SF) x inches of rainfall x 0.62 gal/SF per inch x 0.95

The 0.95 is a runoff factor. It assumes that you collect about 95% of the rain that falls on the roof, and 5% is lost to evaporation or diverted.

When choosing monthly rainfall amounts, I suggest you enter the historical rainfall average in this section. Below, in Section 6, you can compare the results to a dry year and see how the tank storage results compare. An example later in this document will illustrate the comparison.

## 5. Tank Sizing Calculations

This table calculates how much water is left in the storage tank at the end of each month based on the monthly volume of irrigation water used (from Section 3B), how much rainwater is collected (from Section 4), and the size of the tank (from Section 2).

**Formula:** End Volume each Month (gal) = Starting volume of water in the tank leftover from the previous month (gal) + Rainfall added (gal) - Irrigation water used (gal).

If more rainwater is available than is needed each month, the volume at the end of the month will be the tank size because the excess will overflow.

If more water is used for irrigation than is available from the stored water plus the rainwater added, the tank volume will go down to zero. In those months the last row shows how much extra water was needed.

If you drain your tank in the winter, set the values for "Volume of Water in Tank at Start of the Month" and "Water Volume Added From Rainfall" to zero for the months the tank is dry.

## 6. Drought Year - Made Up Rainfall Numbers (What if?)

Section 6 has the same tables as described above. Use this section to compare "What If" scenarios to the results when you use historical average rainfall numbers. Typically, no one year behaves like an average year, so you might enter rainfall numbers from a particularly dry year, or make up numbers for an excessive drought year.

Try several scenarios and also change your tank size to see if that affects how much water you can store from wet months to save for dry months.

If your roof area for collecting rainwater is small, you can only collect so much water, and a larger tank may never fill up. By trying different tank sizes and both average and dry years, you can decide how big a tank is worth the extra money. See the example in the second half of this document.

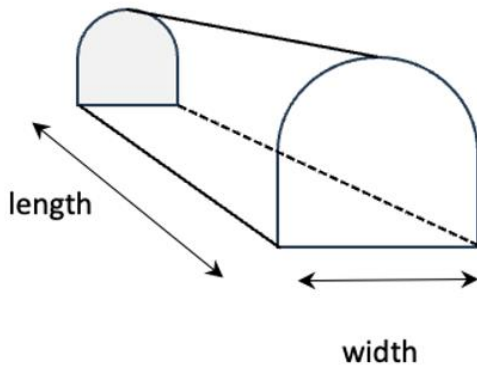
**2 Year Calculator:** The second sheet in the workbook has the same tables as the first, but they extend for two years. If you plan to store water year-round, you can use that version to evaluate how much water you can save from one year into a second year.

## 2. Example: Tank Sizing for Average and Dry Years

The following shows example calculations done for a high tunnel at the KC Farm School at Gibbs Road in Kansas City, Kansas.

### High Tunnel Size:

- The tunnel is 20 feet wide and the gutters extend 65 feet long = 1,300 Square Feet of roof to collect rainwater



### Tank Size:

- Rainwater storage consists of four 275-gallon IBC totes = 1,100 gallons total. The totes are inside the high tunnel to keep them warm in winter.

### Water Use in the Planting Beds

- Inside there are four planting beds, each 60 feet long
- Irrigated area: 4 beds x 3 ft wide x 60 ft long = 720 square feet of irrigated area
- Irrigation rates: 0.5"/week winter, 1"/week spring and fall, 1.5"/week summer



## Rainfall Scenarios

Two rainfall scenarios were evaluated:

- Long term average monthly rainfall
- 2022, a year that was dry in August - October

The results are shown below:

3B. Weekly Irrigation Rate + How Much Water You Use Each Month													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Weekly Irrigation Rate ("/week)	0.5	0.5	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.0	1.0	0.5	
Monthly Irrigation Water Volume Used (gal)	988	893	1,977	1,913	1,977	2,870	2,965	2,965	2,870	1,977	1,913	988	24,297

## Average Rainfall Year

4. Monthly Rainfall and Volume of Rainwater You Can Collect													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall - monthly average (inches):	1.2	1.4	2.7	3.9	5.3	5.3	4.1	4.6	3.4	3.4	1.9	1.5	38.8
Runoff Volume (gal)	942	1,072	2,029	2,948	4,074	4,051	3,132	3,538	2,626	2,634	1,432	1,156	29,633

5. Tank Sizing Calculations													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Volume of water in tank at start of the month (gal)	0	0	179	231	1,100	1,100	1,100	1,100	1,100	857	1,100	619	
Water volume available from rainfall (gal)	942	1,072	2,029	2,948	4,074	4,051	3,132	3,538	2,626	2,634	1,432	1,156	29,633
Water used for irrigation (gal)	988	893	1,977	1,913	1,977	2,870	2,965	2,965	2,870	1,977	1,913	988	24,297
Volume of water in tank at the end of the month (gal)	0	179	231	1,100	1,100	1,100	1,100	1,100	857	1,100	619	786	
Supplemental water needed (gal)	47	0	0	0	0	0	0	0	0	0	0	0	47

## Dry Autumn – 2022

4. Monthly Rainfall and Volume of Rainwater You Can Collect													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall - monthly average (inches):	0.8	0.7	5.1	2.4	8.5	4.7	2.3	2.4	0.8	1.7	4.0	1.2	34.6
Runoff Volume (gal)	613	536	3,905	1,838	6,508	3,599	1,761	1,838	613	1,302	3,063	919	26,493

5. Tank Sizing Calculations													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Volume of water in tank at start of the month (gal)	0	0	0	1,100	1,025	1,100	1,100	0	0	0	0	1,100	
Water volume available from rainfall (gal)	613	536	3,905	1,838	6,508	3,599	1,761	1,838	613	1,302	3,063	919	26,493
Water used for irrigation (gal)	988	893	1,977	1,913	1,977	2,870	2,965	2,965	2,870	1,977	1,913	988	24,297
Volume of water in tank at the end of the month (gal)	0	0	1,100	1,025	1,100	1,100	0	0	0	0	1,100	1,030	
Supplemental water needed (gal)	376	357	0	0	0	0	104	1,128	2,257	675	0	0	4,897

Note that when using long-term average rainfall numbers, no water is needed to supplement the rainwater except for a little bit in January when the tank starts the month empty. If you just look at the average numbers the system looks great.

However, in 2022 the rainfall was only about 4-inches below average but it had a noticeable effect on rainwater availability, especially in July through October when extra water is needed. This shows the limitation of relying on average numbers for planning.

If you want, you can also make up rainfall numbers that simulate a serious long-term drought such as a two- or three-month dry period to help evaluate the water storage volume needed for a severe scenario.

### Evaluating Different Tank Sizes

Another way to use the calculator is to change the tank storage volume and see if it holds enough water to survive dry periods. The example below uses the rainfall from 2022, the year with the dry autumn. The current tank storage volume is 1,100 gallons. Then the tank volume was increased to see if added storage volume would eliminate having to supplement the rainwater in July through October.

Increasing the storage volume to 1,375 gallons by adding another tote eliminates the need for supplemental water in July. Further increasing the storage volume to 2,000 gallons reduces the supplemental water needs over the year, but the tank still goes dry in five months. So, there becomes a trade-off point where a larger tank may not be worth the extra money because you can't collect enough water from the high tunnel roof to fill it every month. Also, for this example at the KC Farm School, there is only room for 4 totes inside the high tunnel, but no more. So that also factors into the planning.

#### Tank: 1375 gallons

4. Monthly Rainfall and Volume of Rainwater You Can Collect													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall - monthly average (inches):	0.8	0.7	5.1	2.4	8.5	4.7	2.3	2.4	0.8	1.7	4.0	1.2	34.6
Runoff Volume (gal)	613	536	3,905	1,838	6,508	3,599	1,761	1,838	613	1,302	3,063	919	26,493

5. Tank Sizing Calculations													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Volume of water in tank at start of the month (gal)	0	0	0	1,375	1,300	1,375	1,375	171	0	0	0	1,150	
Water volume available from rainfall (gal)	613	536	3,905	1,838	6,508	3,599	1,761	1,838	613	1,302	3,063	919	26,493
Water used for irrigation (gal)	988	893	1,977	1,913	1,977	2,870	2,965	2,965	2,870	1,977	1,913	988	24,297
Volume of water in tank at the end of the month (gal)	0	0	1,375	1,300	1,375	1,375	171	0	0	0	1,150	1,080	
Supplemental water needed (gal)	376	357	0	0	0	0	0	957	2,257	675	0	0	4,622

#### Tank: 2000 gallons

4. Monthly Rainfall and Volume of Rainwater You Can Collect													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall - monthly average (inches):	0.8	0.7	5.1	2.4	8.5	4.7	2.3	2.4	0.8	1.7	4.0	1.2	34.6
Runoff Volume (gal)	613	536	3,905	1,838	6,508	3,599	1,761	1,838	613	1,302	3,063	919	26,493

5. Tank Sizing Calculations													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Volume of water in tank at start of the month (gal)	0	0	0	1,928	1,853	2,000	2,000	796	0	0	0	1,150	
Water volume available from rainfall (gal)	613	536	3,905	1,838	6,508	3,599	1,761	1,838	613	1,302	3,063	919	26,493
Water used for irrigation (gal)	988	893	1,977	1,913	1,977	2,870	2,965	2,965	2,870	1,977	1,913	988	24,297
Volume of water in tank at the end of the month (gal)	0	0	1,928	1,853	2,000	2,000	796	0	0	0	1,150	1,080	
Supplemental water needed (gal)	376	357	0	0	0	0	0	332	2,257	675	0	0	3,997

## **References**

Precipitation data comes from the National Weather Service.

The RWH calculator was inspired by education and resources from the American Rainwater Catchment Systems Association (ARCSA). This fine organization provides education and advanced training for those interested in rainwater harvesting. <https://arcsainternational.org/>

## **Limitations**

The RWH calculator was developed to be an open source and free resource. No guarantee to the accuracy of the results is made. Users are responsible for interpretation and use of their results.

Users may copy and share the calculator, but please cite the original source and do not knowingly use it to train AI models.

Prepared for KC Farm School at Gibbs Road, Kansas City, Kansas. November 2025. <https://www.kcfarmschool.org/>  
By David Dods. Send inquiries to [daviddods@zohomail.com](mailto:daviddods@zohomail.com)