



The Right Answer: How to Find Unbiased, Research-Based Answers Horticultural Questions

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Introduction

How do you find reliable, up-to-date, unbiased, research-based answers to gardening/horticulture questions? Online searches are the most common and easily accessible way to look for answers, but the web contains a lot of conflicting information, advertisements, and information that does not apply to your geographic area. How do you quickly sort through it all to find the right answer to your question in order to save yourself time, effort, money, frustration, and mistakes? To be a smart information consumer, you need to know how to find and evaluate both the information and the sources. This document will help you with the process of finding unbiased, research-based horticultural information for Virginia.

What Is the question? What Are You Looking for?

- Do you want to diagnose a problem, determine the cause of a problem, or find a solution to a problem?
- Do you want to identify an insect, disease, weed, flower, or plant?
- Do you want to find information specific to your location?

Write out your question and then list the key terms. For example, you have an unknown weed in your lawn. The question is, “What is this weed in my lawn, and how do I control it?” The key terms are “lawn,” “weed,” “identification,” and “control.”

Starting the Search

Web Browsers

Computers and mobile devices use different web browsers to access the internet.

- Examples for Macs: Safari, Google Chrome, Firefox, Opera, and Chromium.
- Examples for PCs: Google Chrome, Firefox, Opera, Internet Explorer, and Microsoft Edge.

Search Engines

Computers and mobile devices also use different search engines to find information on the internet. Search engines usually display an empty box, inside which you can type key terms. The box often has a magnifying glass symbol beside it (fig. 1).

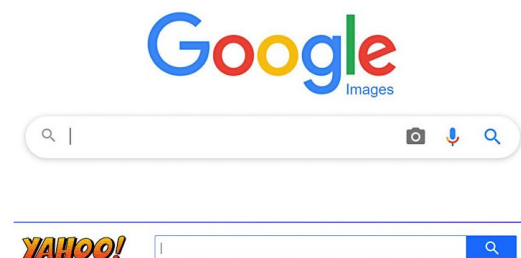


Figure 1. Examples of search engine boxes.

Examples of search engines include Google, Bing, Yahoo, Duck Duck Go, Ask.com, and Ecosia. You can get different information depending on the search engine you use and the order of the terms entered. A web browser should be able to access any search engine.

Click on the icon for your web browser either on your desktop or as part of your taskbar. Some internet browsers default to a specific search engine. For example, Google Chrome defaults to Google. You can use the default search engine or type the name of the search engine you want to use into the search box and click <enter>. Then type your key terms into the search box (fig. 2). This will bring up a wide variety of information in many formats, including websites, photos, advertisements, and peoples' personal opinions and experiences.



Figure 2. Example of search engine with terms entered.

Narrowing the Search

- Add a space and “ext” or “edu” after your key terms. This will search for information from extension and education sites like universities that publish research-based information.
- Add a space and “gov” or “org” to search for information from government agencies, societies, organizations, or nonprofit groups.
- Add a word like “image,” “scholar,” “map,” or “clip art” after your key terms to search for specific information formats like photos, scientific journal articles, maps, or clip art. If you are using Google, helpful format tabs can be found across the top of the page.
- Add a hyphen (-) or “not” before a word to exclude that information from your search. For example:

“elderberry plant not extract” or “elderberry plant -extract.”

- Add quotation marks to search for an exact word or phrase. For example: “red tulip.”
- Add the words “and” or “or” to help narrow your search. For example: “elderberry plant and health benefits,” or “elderberry plant or black elderberry.”

Image Searching by a Description

If you know what something looks like but don't know what it is, you can enter key terms in image searches through web browsers. You will need to use the most notable descriptive adjectives.

For example, if you are using the Google search engine, click on the image tab at the top of the webpage. When you type “black bug yellow stripes,” images that have similar descriptions will come up. You may be able to identify your bug as a two-lined spittlebug. If you type “indoor plant with white flowers and long green leaves,” you may find a picture that matches your plant, identifying it as a peace lily. You can then go back to a general search engine and type in “two-lined spittlebug” or “peace lily” to bring up more information, such as the scientific name, the life cycle of the insect or plant, and control measures.

Image Searches Using a Photo

Search with a photo to help identify a plant or insect. Google image search is the most common free image search tool. On your phone or computer, go to images.google.com. The Google Images title will appear over a search box on the page. To the right of the search box is an icon of a camera (fig. 3). Click that icon. Choose “upload image,” and it will give you access to your files. Search your files and choose the image you want to use. Google Images will automatically search for similar images to help you identify yours.

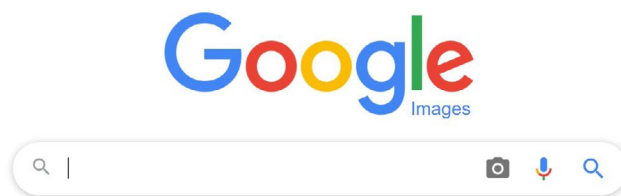


Figure 3. Google Images search box with camera icon for uploading image.

Searching Within a Website or Document

- Individual websites usually have a search box in the upper right corner. You can enter key terms in the box to quickly get to specific information on the site.
- Within a document, you can use your device’s “find” function to search for a specific word or name in the document. Press and hold <Ctrl> and <F>, or <Command> and <F>. This brings up a “find” box you can use to search. If you are in a document, you can also get to the “find” function from the Edit tab/section on the software tool bar.
- In PDF (Portable Document Format) documents, you can search for the definitions of a word you don’t know. Right click on the word. Click “select tool” on the dropdown menu. Highlight the term, then right click again and select “look up” to get the definition.

Evaluating Information

Sources

A lot of the information that comes up when you search will not be useful or pertinent. Personal opinions and advertisements can be biased. Search results that have the word “Ad” next to them are promoting something. Information on .com sites may be based on sales. Some information might not be appropriate for your geographic area. Care should be taken to ensure that information that is time- or temperature-sensitive, such as planting dates, planting depth, pruning times, bloom periods, or fertilizer or pesticide treatments, should come from a website in a similar USDA Plant Hardiness Zone. For an example, you would not want to use a lawn maintenance calendar from Michigan for a Virginia lawn. Grassroots, society, and nonprofit organization websites have useful information, but they are generally focused on a specific cause or geographic area and are also usually seeking support through volunteers and donations. University (.edu), extension (.ext), and government (.gov) websites are the best sources for unbiased and up-to-date information.

Age of Information

Old information can be useful, but be cautious. Using

the most up-to-date information is especially important. Consider using information published within the last 10 years. For example, with fertilizer and pesticides, determine whether the product is legal to use in your area and what the appropriate timing and application rates are. With food safety, older tomato varieties had more acidic qualities than current types, so canning guides from the 1940s create unsafe canned foods when using some current varieties of tomato. Some sources update information continuously while others do it annually or periodically. For example, the Virginia Tech Pest Management Guides are published annually, while Virginia Cooperative Extension publications are updated every five years.

Common File Formats

- DOC/DOCX – short for DOCument file, usually a text file.
- PDF (Portable Document Format) – protects files from being changed, but they can still be shared or printed.
- JPG, TIFF/TIF, GIFF/GIF, HEIC/HEIF, PNG – for photos/images.
- PPT or PPTX – slide presentation software for Microsoft PowerPoint.
- WMV – Windows media format for video files.

Checklist for processing if the information is a valid resource

- Do you or your colleagues know this resource?
- Have you read/used any information from this resource before?
- Is the information up to date/current?
- Can you easily identify and contact the publisher/source of the information?
- Is it clear whether any fees will be charged for using the information or if the information is copyrighted?

Information Management

What do you do when you find information you want to use?

- Download the information to print or to keep on file.

Look at the number of pages before hitting the print button!

- Bookmark the site so you can come back to it easily (usually an icon on the top right corner of the toolbar). If the site moves to another web address, it usually leaves a forwarding message or link.
- Send the information to someone. Some websites have an icon you can click to forward information. You can also copy and paste the website address into an email message.
- Use a citation management system such as Mendeley, EasyBib, EndNote, Zotero, RefWorks, or Citationsy if you are keeping track of many references or sites to create a bibliography or reference list.
- If you use information for a presentation, check for copyrights. If you want to use copyrighted information, ask for permission and link to the source or cite it on your document or in your presentation.
- Extension, government, and university resources are generally available copyright-free.

Horticultural Resources

Universities, Extension, and Government

Virginia Tech – <https://vt.edu>

Virginia State University – <https://vsu.edu>

University of Maryland Extension – <https://extension.umd.edu>

North Carolina State University Extension – <https://ces.ncsu.edu>

Virginia Cooperative Extension – <https://ext.vt.edu>

Virginia Institute of Marine Science (VIMS; part of William & Mary) – www.vims.edu

Virginia Department of Wildlife Resources – <https://dwr.virginia.gov/>

Virginia Department of Conservation and Recreation (DCR) – <https://dcr.virginia.gov>

Virginia Department of Forestry (DOF) – <http://dof.virginia.gov>

Virginia Department of Agriculture & Consumer Services (VDACS) – <http://vdacs.virginia.gov/>

U.S. Department of Agriculture (USDA) – www.usda.gov

U.S. Environmental Protection Agency (EPA) – www.epa.gov

Botanical Gardens

JC Raulston Arboretum – <https://jcra.ncsu.edu>

Mt. Cuba Center – <https://mtcubacenter.org>

Lady Bird Johnson Wildflower Center – www.wildflower.org

Missouri Botanical Garden – <https://www.missouribotanicalgarden.org>

Local Programs

Virginia Association of Soil and Water Conservation Districts – <https://vaswcd.org>

James River Association – <https://thejamesriver.org>

Lynnhaven River NOW – www.lynnhavenrivernow.org

Elizabeth River Project – <https://elizabethriver.org>

Societies, Councils, and Nonprofits

Chesapeake Bay Foundation – www.cbf.org

Alliance for the Chesapeake Bay – www.allianceforthebay.org

Virginia Native Plant Society – www.vnps.org

Virginia Camellia Society – <http://www.genserva.com/vcs/>

American Daylily Society – <https://daylilies.org>

US Composting Council – www.compostingcouncil.org

Insects/Pollinators

Virginia State Beekeepers Association – www.virginia-beekeepers.org

Virginia Tech Department of Entomology Insect Collection – <https://collection.ento.vt.edu/>

Xerces Society for Invertebrate Conservation – <https://xerces.org>

Bug Guide (Iowa State University) – <https://bugguide.net/node/view/15740>

All About Birds (Cornell Lab of Ornithology) – www.allaboutbirds.org/news

Pollinator Partnership: Ecoregional Planting Guides – www.pollinator.org/guides#

Native Plants

Digital Atlas of the Virginia Flora – www.vaplantatlas.org

Virginia Department of Conservation and Recreation – www.dcr.virginia.gov/natural-heritage/nativeplants

Virginia Native Plant Society – www.vnps.org

Weeds

Virginia Tech Weed Identification – <https://weedid.cals.vt.edu>

Plant Disease

Vegetable MD Online (Cornell University) – <http://vegetablemdonline.ppath.cornell.edu/cropindex.htm>

Extension Ask an Expert – <https://ask.extension.org/ask>

Plant Identification

USDA Plants Database – <http://plants.usda.gov>

Wildflowers – www.wildflower.org/plants

Southeastern Flora – www.southeasternflora.com

Wetland Plants (Virginia Institute of Marine Science) – www.ccrm.vims.edu/publications/pubs/8x11brochure-annotated2rh.pdf

World Wide Flowering Plant Family Identification – <https://www.colby.edu/info.tech/BI211/PlantFamilyID.html>

Virginia Tech Dendrology – <http://dendro.cnre.vt.edu/dendrology/ident.htm>

USDA Plant Hardiness Zones – <https://plants.usda.gov/hardiness.html>

Apps

Flora of Virginia Project – <https://floraofvirginia.org>

Virginia Tech Tree ID App – https://play.google.com/store/apps/details?id=org.potts-software.agps21&hl=en_US&gl=US

LeafSnap (plant identification) – <http://leafsnap.com>

Picture This – Botanist in Your Pocket (plant identification) – www.picturethisai.com

PlantNet Plant Identification- <https://identify.plantnet.org/>

Insect Identification for the Casual Observer – www.insectidentification.org

Cornell Lab Merlin Bird ID App – www.allaboutbirds.org/news

iNaturalist- www.inaturalist.org

Seek -https://www.inaturalist.org/pages/seek_app

Pesticides

Virginia Cooperative Extension Pest Management Guide: Home Grounds and Animals – www.pubs.ext.vt.edu/456/456-018/456-018.html

National Pesticide Information Center – <http://npic.orst.edu>

Virginia Pesticide Investigators – www.vdacs.virginia.gov/about-division-of-consumer-protection.shtml

U.S. EPA Pesticides – www.epa.gov/pesticides

Free Image Sources

Pixabay, Unsplash, StockSnap, Flickr Creative Commons, Pexels, Snapwire, Burst, Free Images, Canva

Additional Resources

Exploratorium Public Learning Laboratory. 2002. “Searching the Internet.” www.exploratorium.edu/ronh/research/index.html.

GCF LearnFree.org. 2020. “Using Search Engines” Unit 8 in *Internet Basics*. Accessed Dec. 9. <https://edu.gcfglobal.org/en/internetbasics/using-search-engines/1>.

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