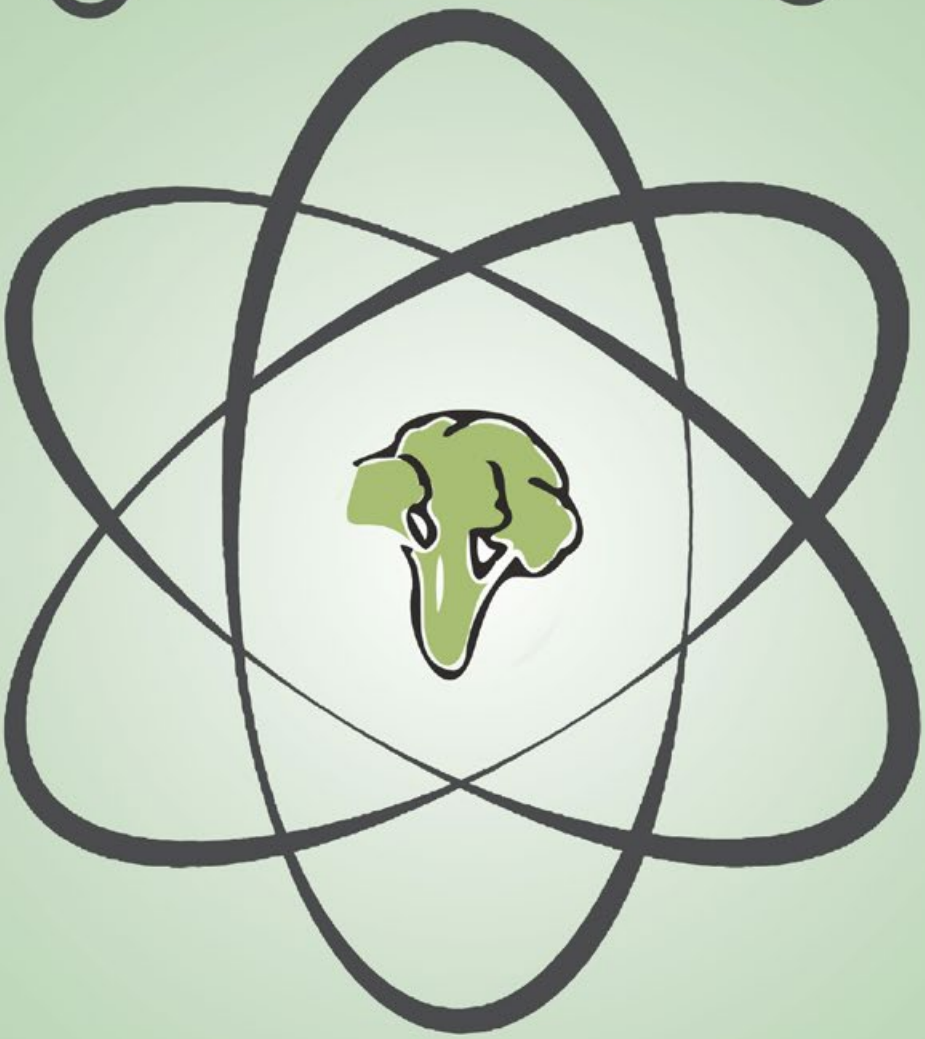
Nutrivore

GUIDE TO

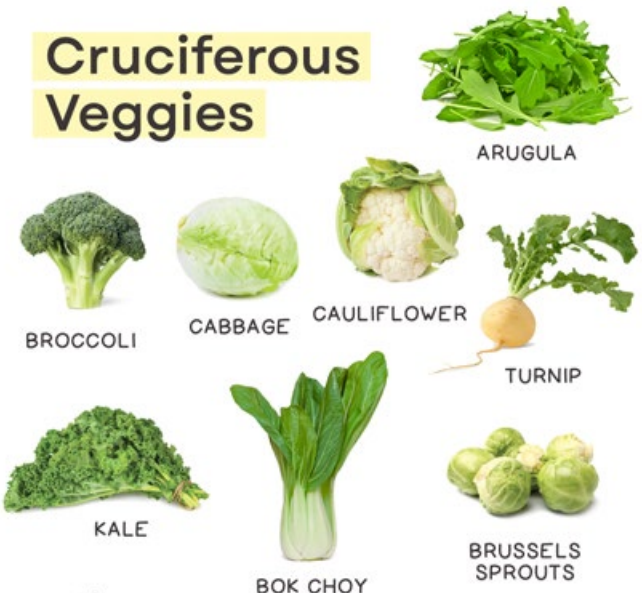


Cruciferous Veggies

BY THE TEAM AT NUTRIVORE

Table of Contents

Introduction to Cruciferous Veggies



Have you ever noticed how Brussels sprouts look like tiny cabbage heads, and cauliflower looks like white broccoli? It's not a coincidence! All of these vegetables (and many more) are close botanical relatives known as *cruciferous vegetables*, or sometimes simply *crucifers* (a nickname derived from the Latin word *cruciferae*, which means "cross-bearing"—inspired by the cross-like shape of these plants' flowers!). You might also hear them called "Brassica vegetables," referring to the taxonomic genus they all belong to.

Along with being one of the most diverse groups of cultivated plants in the world, cruciferous vegetables are absolute powerhouses of nutrition. In fact, they consistently rank among the most health-promoting foods we can put into our bodies!

Did that whet your appetite? Hold on, because we're just getting started! Let's find out more about this amazing plant family and why it deserves a place at the table.

What Are Cruciferous Veggies?

Many cruciferous veggies actually originated thousands of years ago as a single species of uncultivated wild cabbage, Brassica oleracea. Over time, this species was bred into many now-familiar cultivars such as cabbage, cauliflower, broccoli, Savoy cabbage, Brussels sprouts, collard greens, kohlrabi, gai lan (Chinese broccoli), and kale! Many additional crucifers are cultivars of another species, Brassica rapa: turnips, napa cabbage, bok choy, mizuna, and rapini all fall here. The rest are subspecies of Brassica nigra, Brassica juncea, Brassica napus, and Brassica carnita, and include veggies such as horseradish, watercress, garden cress, radish, daikon, collard greens, rutabaga, and mustard greens. Yum!

In all, we've managed to turn all parts of Brassica plants into foods we can eat. Some Brassica cultivars were bred to have edible roots (like rutabaga and turnips), some were bred for their leaves (like kale and collards), some were bred for edible buds (like Brussels sprouts), some were bred for their flowers (like cauliflower and broccoli), some were bred for their stems (like kohlrabi), and some were bred for their seeds (like mustard). Hence why a mere six Brassica species are able to produce such a diverse range of veggies!

Crucifers are originally native to Western Europe, the Mediterranean, and some temperate areas of Asia. But, thanks to so many years of cultivation, they're now available all over the world—growing in regions as radically different as Alaska and Spain!

What Makes Cruciferous Veggies So Great?

When it comes to health-promoting compounds, these veggies tick all the boxes: they're packed with phytonutrients, teeming with vitamins and minerals, and bursting with fiber. Crucifers, how do we love thee? Let us count the ways!

Phenomenal Phytonutrients

One of the most unique features of crucifers is that they contain glucosinolates—a type of sulfur-containing phytonutrient found exclusively in Brassica plants, and which give these vegetables their characteristic pungent flavor. Glucosinolates aren't biologically active on their own, but when the cells of cruciferous veggies get damaged (such as by chewing, cutting, or other processing), they release an enzyme called myrosinase. This enzyme then breaks down glucosinolates into new compounds called isothiocyanates, which is where the real magic happens!

Research spanning human epidemiology, animal models, and *in vitro* experiments shows that isothiocyanates have significant anti-cancer, anti-diabetic, cardioprotective, antimicrobial, antioxidant, and neuroprotective effects. For example, the isothiocyanate sulforaphane has been studied for its ability to halt cancer cell growth, kill cancer cells, upregulate a number of phase II detoxification enzymes, and protect healthy cells from damage from environmental carcinogens! Another isothiocyanate called indole-3-carbinol, which gets converted from the glucosinolate glucobrassicin, has also been shown to cause cancer cell death and cell cycle arrest, along with altering estrogen metabolism.

Additionally, cruciferous vegetables tend to be high in several important carotenoids—including not only beta-carotene (which can be converted to vitamin A within the body), but also lutein and zeaxanthin. Lutein and zeaxanthin play major roles in maintaining eye health, due to their high concentration in the retina and their ability to filter harmful blue-light rays (in turn protecting critical parts of the eye from light-induced oxidative damage). As a result, these two phytochemicals can help protect against age-related macular degeneration and cataracts, as well as reduce the risk of retinitis pigmentosa.

Crucifers from the above-ground parts of Brassica plants are also excellent sources of chlorophyll—the pigment that traps light for photosynthesis and gives plants their green color. But, chlorophyll has import-

ant functions for humans, too! It can actually combat some of the harmful compounds formed when meat gets cooked, and also has significant anti-inflammatory and antioxidant properties. Some research even shows it can beneficially modulate the gut microbiota, including in ways that contribute to healthy body composition.

Crucifers with a purplish or reddish color—such as red radishes, purple cauliflower, red cabbage, purple Brussels sprouts, and purple kale—contain a group of flavonoids called anthocyanins. Anthocyanins appear to have anti-inflammatory and neuroprotective effects, could improve glucose tolerance, may reduce the risk of chronic diseases like heart disease and cancer, and may even have pain-relieving properties (due to an affinity for certain "pain-sensation" cell membrane receptors in the brain!).

Lastly, crucifers are great sources of some other notable phytonutrients. For example, many are high in quercetin—a flavonoid that's been shown to reduce blood pressure, enhance insulin sensitivity, reduce inflammation, support wound healing, and even boost immunity. These activities give it protective effects against diabetes, cancer, cardiovascular disease, arthritis, and even neurodegenerative diseases like Alzheimer's disease! Crucifers also tend to be high in kaempferol, an antioxidant with wide-ranging cancer-fighting properties (including reducing tumor growth, preventing metastasis, inducing cancer cell death, and stopping tumors from creating new blood vessels). Kaempferol intake is linked to lower rates of liver, colon, skin, stomach, bladder, and pancreatic cancer.

Magnificent Micronutrients

Crucifers are rich in some important vitamins and minerals! Although they vary in their exact nutritional profiles, they tend to be high in the following micronutrients:

- VITAMIN K, which plays a vital role in coagulation, bone metabolism, cellular function, and the prevention of soft tissue calcification. Two cups of raw, chopped kale contains 162% of the DV for this nutrient! Cabbage, Brussels sprouts, broccoli, garden cress, watercress, gai lan (Chinese broccoli), and mustard greens are also wonderful sources of vitamin K.
- VITAMIN B9 (FOLATE), an essential B vitamin that plays roles in blood cell production, the formation of genetic material (including DNA), cell growth, cardiovascular health, cancer protection, and cognitive and neurological health. Broccoli, kale, collard greens, cauliflower, Brussels sprouts, mustard greens, gai lan (Chinese broccoli), savoy cabbage, and daikon are all great sources!

- VITAMIN C, a water-soluble vitamin with powerful antioxidant properties, with important roles in the immune system and collagen production. Mustard greens, kale, gai lan (Chinese broccoli), kohlrabi, garden cress, bok choy, savoy cabbage, daikon, broccoli, rutabaga, turnips, cauliflower, and cabbage are chock full of vitamin C.
- CALCIUM, a major structural component of bones and teeth that also serves as an electrolyte—a type of electricity-conducting mineral needed for regulating nerve impulses, muscle contraction, heartbeat, blood pH, and fluid balance. Mustard greens, kale, and collard greens all contain about 10% or more of the DV for calcium per cup.
- MAGNESIUM, an essential mineral that acts as an electrolyte and structural component in cells and bone tissue, and that serves as a cofactor for hundreds of different enzymes (giving it a role in over 300 metabolic reactions!). Rainbow chard provides 14% of the DV of magnesium in a 2-cup serving!
- MANGANESE, a mineral that serves as a cofactor and component of numerous enzymes—giving it roles in carbohydrate metabolism, amino acid synthesis, gluconeogenesis, detoxification, lipid processing, free radical defense, bone and collagen formation, and wound healing. Mustard greens, kale, gai lan (Chinese broccoli), garden cress, savoy cabbage, rutabaga, turnips, broccoli, and collard greens all contain notable amounts!

Fabulous Fiber

On top of all their other health-promoting goodies, crucifers are amazing sources of fiber. Fiber is a great example of a nutrient that isn't labelled as essential, but that is absolutely fundamental for our health! Along with regulating gut motility (promoting regularity) and some gastric hormones, it supplies our gut bacteria with fermentable substrate (i.e., food!) so that important microbes can flourish and remain diverse. High fiber intake also reduces the risk of cardiovascular disease and of many forms of cancer (especially colorectal cancer, but also liver cancer, pancreatic cancer, and others), and promotes overall lower inflammation. High-fiber diets reduce the risk of mortality in cases of kidney disease and diabetes, and can even reduce your risk of dying from an infection!

Per 100 g of raw vegetable, crucifers contain the following amounts of fiber:

- ARUGULA: 1.6g
- BOK CHOY: 1.0g
- BROCCOLI: 2.6g
- BRUSSELS SPROUTS: 3.8g
- CABBAGE: 2.3g
- CAULIFLOWER: 2g
- COLLARDS: 4g
- GAI LAN (CHINESE BROCCOLI): 2.6g
- GARDEN CRESS: 1.1g
- HORSERADISH: 3.3g
- KALE: 4.1g
- KOHLRABI: 3.6g
- MUSTARD GREENS: 3.2g
- RADISHES: 1.6g
- RUTABAGA: 2.3g
- TURNIP: 1.8g
- WATERCRESS: 0.5g

Health Benefits of Cruciferous Veggies

Given their awesome phytonutrient, micronutrient, and fiber profiles, it shouldn't come as a surprise that cruciferous veggies have demonstrated wide-ranging health benefits and protection against a number of diseases. Here's a rundown of the many ways they've been scientifically shown to benefit our health!

Reduced risk of cardiovascular disease:

Crucifers are astoundingly heart-healthy! Their cardioprotective effects are due in large part to their glucosinolates, which are able to improve lipid metabolism (including reducing LDL cholesterol), reduce inflammation, and lower oxidative stress.

Specifically, studies have directly linked cruciferous veggie consumption with improved cardiovascular and mortality outcomes. For example, a 2017 systematic review and meta-analysis—which included data from 95 studies evaluating fruit and vegetable intake—found that eating 100 grams of cruciferous vegetables per day (about one serving) led to an 18% decrease in ischemic stroke, a 17% decrease in hemorrhagic stroke, and a 12% decrease in all-cause mortality and cardiovascular disease!

Likewise, a 2019 meta-analysis showed that cruciferous vegetables were some of the most health-protective items to consume on a daily basis. For every 100 grams of cruciferous vegetables consumed daily, cardiovascular disease risk dropped by 11%, and all-cause mortality risk decreased by 10%.

A 2011 analysis of the Shanghai Women's Health Study and Shanghai Men's Health Study (encompassing 134,796 adults) also found substantial heart benefits for regularly eating cruciferous vegetables. Compared to people with the lowest intake of crucifers (one or two servings per week), individuals who ate one or two servings daily (an average of 166 grams per day for women and 208 grams per day for men) had an astounding 31% lower risk of cardiovascular disease mortality, and a 22% lower risk of total mortality.

Reduced inflammation:

A 2014 trial of healthy young adults found that eating a high-cruciferous-vegetable diet reduced some markers of inflammation associated with several disease states—particularly the inflammatory cytokine interleukin-6, or IL-6.

Reduced risk of cancer:

Cruciferous vegetables are true warriors against cancer. In fact, many of the activities of their glucosinolates directly translate to cancer protection—including upregulating genes involved

in protecting against DNA damage, inflammation, and oxidative stress, while also increasing the activity of detoxification enzymes that help remove toxic substances and carcinogens from the body.

But, that's not all! The chlorophyll in green crucifers is also a powerful cancer fighter, capable of binding to carcinogens and inhibiting their intestinal absorption—in turn preventing them from reaching your tissues and causing harm. In fact, chlorophyll binds to some of the most widespread foodborne carcinogens we're exposed to, including those that form when cooking meat at high temperatures (polycyclic aromatic hydrocarbons and heterocyclic amines) and those that can contaminate peanuts, corn, and dried spices (aflatoxin-B1).

In all, science shows that cruciferous vegetables (and their various bioactive compounds) can induce cancer cell death, inhibit the growth and proliferation of cancer cells, and reduce inflammation and oxidative stress (both drivers of cancer initiation and progression).

With that in mind, it's no surprise that a variety of prospective cohort and case-control studies have found that overall cruciferous vegetable consumption is associated with lower risk of:

- BLADDER CANCER (up to a 20% lower risk)
- BREAST CANCER (up to a 15% lower risk)
- COLORECTAL CANCER (up to an 18% lower risk)
- ENDOMETRIAL CANCER (up to a 21% lower risk)
- GASTRIC CANCER (up to a 19% lower risk)
- LIVER CANCER (up to a 27% lower risk)
- LUNG CANCER (up to a 25% lower risk)
- OVARIAN CANCER (up to an 11% lower risk)
- PANCREATIC CANCER (up to a 21% lower risk)
- PROSTATE CANCER (up to a 10% lower risk)

Reduced risk of diabetes:

Cruciferous veggies could even help protect against diabetes! A 2016 meta-analysis of prospective studies found that people with the highest versus lowest consumption of cruciferous vegetables had a 16% lower risk of developing diabetes over the course of follow-up, even when other diabetes risk factors were accounted for (like BMI, smoking, and physical activity).

A 2012 randomized double-blind trial found that for type 2 diabetics, consuming 10 g daily of broccoli sprouts led to significantly lower insulin levels and HOMA-IR (an important indicator of insulin resistance) measurements than the placebo group. Likewise, a 2016 placebo-controlled crossover trial found that

consuming 7 g or 14 g of kale with a high-carbohydrate meal led to significantly lower blood sugar rises in people with elevated fasting blood sugar levels.

And, a variety of animal studies have found that red cabbage in particular can combat not only diabetes, but also complications of the disease. For example, in animal models of diabetes, red cabbage extract has been shown to ameliorate diabetic nephropathy, inhibit digestive enzymes linked to type 2 diabetes, lower blood sugar levels, lower glycated hemoglobin levels, improve glucose tolerance, and increase the number of pancreatic beta-cells—all while also reducing vascular complications caused by diabetes.

Improved gut health:

Crucifers also happen to be incredibly beneficial for gut health! In fact, many of their health benefits come specifically through the interplay of their fiber and phytonutrients with the gut microbiota.

For example, trials of high-cruciferous-vegetable diets have shown that these vegetables can very quickly improve the state of our gut microbiota. In one controlled crossover feeding study, participants underwent several different two-week diets—including a control diet low in fiber and phytochemicals, and a diet rich in cruciferous vegetables (cauliflower, cabbage, broccoli, and radish sprouts). A mere two weeks on a high-cruciferous vegetable diet was enough to cause significant compositional changes in the participants' gut microbiota!

In another randomized crossover study, healthy adults spent two weeks eating a diet high in cruciferous vegetables (including broccoli and cauliflower), with a two-week washout period between the dietary phases. High intake of these vegetables led to a lower abundance of sulfate-reducing bacteria—a big boon for gut health, because these microbes have been associated with ulcerative colitis and irritable bowel syndrome!

Some studies have also examined specific cruciferous vegetables in relation to gut health. In an experiment with rats, for example, a diet supplemented with kale was able to improve microbial diversity, enhance several bacterial metabolic functions, and combat the inflammatory state induced by a high-fat diet. Another study of rats with human-associated microbiota found that four weeks of daily Brussels sprouts consumption led to higher levels of the important short-chain fatty acids butyrate and acetate. And in a controlled feeding study in humans, 18 days of eating 200 g of cooked broccoli daily not only caused beneficial shifts in the gut microbiota composition (including a positive change in the Bacteroidetes to Firmicutes ratio, which has been associated with leanness in a number of studies); it also increased biological pathways involved in endocrine function and energy metabolism!

Cruciferous Vegetable Nutrivore Scores

Wondering how crucifers stack up in terms of their Nutrivore score? Here's a list of some of the most common crucifers and their SUPER scores:

Arugula	2019
Bok Choy	3428
Broccoli	2833
Brussels Sprouts	2817
Cabbage	2034
Cauliflower	1585
Collard Greens	3323
Gail Lan (Chinese Broccoli)	2365
Garden Cress	11265
Horseradish	850
Kale	4233
Kohlrabi	2497
Mustard Greens	5464
Radish	5863
Rapini (Broccoli Rabe)	4155
Red Cabbage	1369
Rutabaga	766
Turnip	1954
Watercress	6929

What About the Goitrogens?

Cruciferous vegetables have long been haunted by rumors that they're bad for thyroid health. This is because some of their glucosinolates act as goitrogens—compounds that interfere with thyroid hormone synthesis, typically by blocking iodine uptake by the thyroid gland.

Early studies in iodine-deficient animals showed that high consumption of cabbage or other cruciferous vegetables increased the incidence of goiters, leading to recommendations that people with hypothyroidism steer clear of this plant family (and in some cases, fears that too many crucifers could cause thyroid dysfunction even in people with initially healthy thyroids). But, research in living humans has painted a much different picture! For example, a human trial found that eating 150 grams of Brussels sprouts daily for four weeks had no effect on thyroid function, even though these veggies contain some of the highest levels of goitrogens out of any crucifer. A 2019 human trial found that 12 weeks of supplementation with a broccoli sprout extract (treated to be particularly high in isothiocyanates, the main goitrogen in broccoli) had no effect on thyroid function, even in people with autoimmune thyroid disease. And, a 2015 meta-analysis of 18 studies found that cruciferous vegetable intake was only associated with thyroid cancer in areas with widespread iodine deficiency.

What's more, some evidence suggests cruciferous vegetables might support thyroid health on the whole! Animal studies show that supplementation with broccoli or rutabaga sprouts reduces inflammation and oxidative stress in the thyroid, improving thyroid function even in cases of iodine-deficiency hypothyroidism. More research is needed in humans to test whether this pans out for us, too.

On the whole, cruciferous vegetables—especially at realistic intakes—appear to be a health-promoting food even for people with autoimmune thyroid disease and subclinical hypothyroidism. And, there's definitely no reason to believe they'll harm the thyroid health of people without existing thyroid disease!

A Note on Fermentation

Some crucifers, particularly various cabbages and radishes, are also commonly used for lacto-fermentation (think: sauerkraut and kimchi!). In fact, fermentation has been used as a preservation method for cruciferous veggies for thousands of years.

When fermented, these veggies offer a unique set of health benefits above and beyond their regular fresh state (which is already a high bar to surpass!). For example, unpasteurized fermented cabbage contains probiotic bacteria such as Lactobacillus brevis and Lactobacillus plantarum, which have immune-modulating effects; Lactobacillus brevis may be particularly beneficial for its ability to resist antibiotic exposure—making sauerkraut potentially useful during antibiotic treatment.

Not only that, but the fermentation process leads to the degradation of glucosinolates into bioactive isothiocyanates, and in some cases, unique phytonutrients not present in the unfermented plant are formed (such as gentisic acid)!

Raw vs. Cooked

When it comes to veggies, the million-dollar question is quite often... *raw or cooked?!*

In the case of crucifers, there are pros and cons to both! Raw crucifers retain their full content of heat-sensitive nutrients, including vitamin C and vitamin B1 (thiamin), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B5 (pantothenic acid), vitamin B6 (pyridoxine), and vitamin B9 (folate). They also contain fully active myrosinase, the enzyme responsible for turning glucosinolates into isothiocyanates—which means raw crucifers are likely to provide the highest levels of bioactive compounds.

But, cooking has some perks of its own! For one, it helps break down the tough fiber that can make raw crucifers hard to digest, in turn enhancing the accessibility of any nutrients bound to the cell wall or locked inside the cells. Cooking can also enhance the flavor of these vegetables, as well as reduce their bulky volume (due to water evaporation) so we can fit more cruciferous goodness into our stomachs!

Interestingly, even though heat deactivates myrosinase, some common human gut bacteria actually possess myrosinase-like activity of their own. This means that any cooked cruciferous veggies that make it down to our colon (where those gut microbes reside) still have a shot at producing isothiocyanates, even if the enzymes in the vegetables themselves are no longer active. Having a thriving, diverse gut microbiome (particularly with myrosinase-secreting members of *Lactobacillus*, *Enterococcus*, *Bacillus*, and others!) increases our ability to obtain isothiocyanates from cooked crucifers.

That being said, the specific method of cooking makes a big difference here! While boiling generally reduces both micronutrient and phytonutrient content of cruciferous veggies, steaming and stir-frying are far less damaging, and even preserve some of the myrosinase activity.

In short, a mix of raw and gently cooked crucifers looks like the ticket for getting the best of all worlds!

Are You a Supertaster?

Do you find cruciferous veggies tough to stomach because they're just too bitter? If so, your genes might be to blame! A substantial number of people (around 25-30% of the population) are what's known as supertasters—possessing a heightened sensitivity to taste, particularly bitterness. These supertasting-powers come from carrying two copies of a TAS2R38 gene variant, which causes the tongue to have a relatively higher density of taste buds (and consequently, more taste receptors that allow for the perception of bitterness). This can cause cruciferous vegetables to taste less palatable.

But fear not! Even if you happen to be a supertaster, there are still ways to prepare cruciferous vegetables so that their tastiness—rather than bitterness—shines. Here are some easy ideas:

- **COOK THEM.** Simply cooking your crucifers will help reduce the bitterness present in their raw state! Steaming, roasting, stir-frying, or grilling them can help to mellow out their flavor and bring out their natural sweetness.
- **SEASON THEM UP!** Adding flavorful seasonings can help mask the bitterness of cruciferous vegetables. For example, try adding garlic, lemon juice, or herbs such as thyme or basil to your veggie dishes.
- **PAIR THEM WITH OTHER FOODS.** Pairing cruciferous vegetables with foods that have complementary, non-bitter flavor profiles can also help reduce their perceived bitterness. For example, try adding sweet or savory ingredients to your dish, such as roasted sweet potatoes, caramelized onions, or bacon!
- **SELECT WISELY.** Young cruciferous vegetables tend to be less bitter than older ones. When shopping, look for young, fresh crucifers with bright green or purple leaves, which are an indication of their freshness and tenderness.

Some Practical Pointers

To get the most out of your cruciferous veggies, quality and freshness are huge wins! That means knowing how to properly select and store crucifers once they've made it home to your kitchen. Not only will these tips help your veggies last longer, they'll also help preserve their nutrient content!

But fear not! Even if you happen to be a supertaster, there are still ways to prepare cruciferous vegetables so that their tastiness—rather than bitterness—shines. Here are some easy ideas:

Selection:

- When it comes to leafy crucifers (like chard, kale, and collard greens), LOOK FOR ONES WITH FIRM, VIBRANTLY COLORED LEAVES—avoiding ones that are yellowing, wilted, or showing brown spots.
- LOOK FOR UNIFORMITY—selecting veggies that are comparable in size, shape, and color. This indicates they were harvested at the same time, which means they'll have a similar taste and texture (as well as cook more evenly).
- FOR ROOT CRUCIFERs (like turnips, rutabagas, and radishes), look for ones that feel heavy for their size, with unblemished skin and a firm texture. Smaller root crucifers are younger and sweeter, with what's generally considered the best flavor.
- CABBAGES SHOULD HAVE FIRM, DENSE HEADS, feel heavy for their size, and have vibrantly colored leaves.
- Broccoli and cauliflower should feel HEAVY FOR THEIR SIZE, have consistent coloration, and have heads that are firm and tightly closed.
- When it comes to Brussels sprouts, LOOK FOR ONES THAT ARE BRIGHT GREEN, have tightly packed leaves, are free from mold, and feel firm when you squeeze them. Smaller sprouts tend to be sweeter and more tender!
- WHEN POSSIBLE, CHOOSE SEASONAL! Although crucifers are often available year-round, choosing the varieties in season helps ensure the best flavor and nutrient content.

Storage:

- KEEP THEM DRY! Before storing your crucifers, make sure they're totally dry. Excess moisture can lead to mold growth and spoilage. If you wash them before storing, you can pat them dry with a paper towel or use a salad spinner to remove excess water.
- STORE IN THE REFRIGERATOR. Crucifers won't last long on the counter!
- KEEP THEM SEPARATE FROM ETHYLENE PRODUCERS. Cruciferous vegetables are sensitive to ethylene gas, which some botanical fruits (such as avocados, bananas, pears, peaches, kiwis, cantaloupe, apples, peppers, and tomatoes) emit as they ripen. Exposure to ethylene can cause crucifers to wilt, yellow, and spoil more quickly. So, make sure they don't have any ethylene-producing neighbors where you store them!
- USE WITHIN A FEW DAYS. Cruciferous veggies really shine when eaten fresh, so try to use them within a few days of purchase (three to five is best, but they can sometimes last up to a week). If you need to store them longer, blanching and freezing them can help preserve their freshness. (This is an easy process of quickly cooking the veggies in boiling water, and then putting them in an ice bath before transferring them to the freezer!)

With all that in mind, specific crucifers have some storage nuances! For example, cauliflower stores best in a perforated bag in the fridge, while cabbage does well if it's wrapped in a damp paper towel before storage (it's also an exception to the rule in that it doesn't need to be blanched before freezing!). Meanwhile, Brussels sprouts are best stored untrimmed. Crucifers that are root veggies (like turnips and rutabagas) also have a much longer fridge life, lasting up to two weeks!

Seasonality:

- ARUGULA: Arugula is a cool-weather crop that is typically in season from early spring through late fall.
- BOK CHOY: Bok choy is also a cool-weather crop that is typically in season from late fall through early spring.
- BROCCOLI: Broccoli is typically in season from late fall to early spring, with its peak season being in the winter months.
- BRUSSELS SPROUTS: Brussels sprouts are also in season in the fall and winter months—typically from September through February.
- CABBAGE: Cabbage is a cool-weather crop, in season from late fall through early spring.
- CAULIFLOWER: Cauliflower is in season in the fall and winter months, typically from September through January.
- COLLARD GREENS: Collard greens are in season from late fall to early spring, with their peak season being in the winter months.
- KALE: Kale is a hardy green that can be grown year-round, but its peak season is from mid-winter through early spring!
- KOHLRABI: Kohlrabi is also a cool-weather crop, and is typically in season from early spring through late fall.
- MUSTARD GREENS: Mustard greens are in season in the cooler months of the year, typically from late fall through early spring.
- RADISHES: Radishes are a spring and fall crop, with peak season being in the cooler months.
- TURNIPS AND RUTABAGAS: Turnips are a cool-weather crop and are typically in season from late fall through early spring.

It's worth noting that growing seasons can vary depending on the location and climate, so this list may not apply to all regions. It's always a good idea to check with local farmers or markets to see what's in season in your area!

Recipes

BREAKFAST

Nutrivore Score

461

Rutabaga Breakfast Hash

PREP TIME	COOK TIME	YIELD
10 minutes	30-40 minutes	4 servings

4 slices bacon, chopped

2 rutabaga, peeled and diced

½ onion, diced

3 cloves garlic, minced

½ bunch kale or collard greens, chopped

1 teaspoon salt

¼ teaspoon pepper

6 eggs

1. Preheat the oven to 350°F degrees.
2. Add bacon to a large skillet over medium heat and cook until crispy.
3. Remove bacon with a slotted spoon and add the rutabaga, onion and garlic to the skillet and cook in the rendered bacon grease until the onion is starting to get translucent, about 10 minutes.
4. Add kale and cook until starting to wilt and rutabaga is fork tender, about ten minutes.
5. Add bacon back to the pan and season with salt and pepper to taste.
6. Create shallow wells in the veggie mixture. Crack an egg into each well and bake until the eggs are cooked to your desired doneness, about 10-15 minutes.

Nutrivore Score

406

Sausage, Broccoli and Potato Frittata

PREP TIME	COOK TIME	YIELD
10 minutes	25-30 minutes	4 servings

8 ounces bulk pork sausage

5 ounces bacon, chopped

½ medium-sized yellow onion, diced

½ red bell pepper, diced

8 ounces mushrooms, thinly sliced

1 broccoli crown, cut into very small florets

1 pound cooked and cooled potatoes, peeled and cut into ½-inch cubes

8 large eggs, beaten

1. Heat an ovenproof large skillet over medium-high heat and turn the broiler on high to preheat the oven.
2. Place the sausage and bacon in the pan and break up the clumps with a wooden spoon or spatula while it cooks.
3. Add the onion, bell pepper, mushrooms and broccoli and sauté, stirring occasionally, until vegetables are cooked, 8 to 10 minutes. Add potatoes, and cook just to heat through, 1 to 2 minutes.
4. Add the beaten eggs. Let cook on the stovetop for 1 to 2 minutes, stirring a couple of times.
5. Place the skillet in the oven and broil until the eggs are completely cooked, puffed up, and starting to brown on top, 7 to 10 minutes (it varies from oven to oven, so watch carefully). Serve.

COOKING TIP

TIP: I often double this recipe and make it in a 13-inch deep skillet. In this case, bake in a 425°F oven for 20 to 25 minutes, until completely cooked.

SIDE DISHES

Nutrivore Score

759

Shaved Brussels Slaw with Hazelnuts, Apple, and Mint

PREP TIME	COOK TIME	YIELD
10-20 minutes	15 minutes	5-8 servings

1 cup raw hazelnuts

4 ounces pancetta, diced

2 pounds Brussels sprouts

1 clove garlic, minced

1 lemon (2 tablespoons fresh lemon juice and 1 teaspoon lemon zest)

2 tablespoons olive oil

1/2 teaspoon salt

1 Granny Smith apple, cored and thinly sliced

1/3 cup mint chiffonade

1. To toast the hazelnuts, preheat the oven to 375°F. Place the hazelnuts on a rimmed baking sheet and bake for 10 minutes.
2. Remove the hazelnuts from the oven and immediately pour into a clean tea towel. Fold the tea towel over the hazelnuts and let them sit for 1 to 2 minutes.
3. With the tea towel still covering the hazelnuts, rub the top of the tea towel to start removing the skins. You can open up the tea towel and see how you're doing (at this point, the towel is really just to protect your hands from those hot nuts!). Pick out the hazelnuts that have the skins removed (its fine if there's a little left on them) and continue until you've removed all the skins from the hazelnuts. (Some of the skins will be stubborn, so don't worry if it's not perfect!) Let the hazelnuts cool while you prepare the rest of the ingredients.

4. While the hazelnuts are in the oven, place the diced pancetta in a cold skillet and turn on the heat to medium. Sauté, stirring occasionally, until browned, about 8 minutes. Remove the pancetta from the skillet and set aside to cool while you prepare the rest of the ingredients.

5. Slice the Brussels sprouts very thinly, discarding the stem or an easier method is to trim of the stem first and use a mandoline slicer or a food processor with a slicer attachment. Two pounds off whole Brussels sprouts will give you about 12 ounces shaved.

6. Combine all the ingredients in a bowl and thoroughly mix to serve immediately. If you are not going to serve all of the slaw, use the hazelnuts as a garnish instead of mixing in because they'll go a bit soft during storage in the fridge. Leftover slaw can be stored in the fridge for up to 5 days.

TIP: To chiffonade mint, stack several mint leaves on top of each other and slice very thin strips across the leaves all the way down. Measure ⅓ cup after you chiffonade the mint; it will be close to 1 cup of loosely packed leaves before you chiffonade.

I recommend you buy raw hazelnuts and toast them at home—the flavor of freshly toasted hazelnuts is so much better! But to save yourself time, you can purchase toasted hazelnuts and use them in this recipe; if you do that, skip Steps 1 through 3 and begin making the recipe at Step 4.

TIP: To save yourself time, feel free to purchase 1 (10- to 12-ounce) bag of shaved Brussels sprouts instead of 2 pounds of whole Brussels sprouts. If you buy them preshaved, you can skip Step 5.

Nutrivore Score

1857

Wild Fermented Sauerkraut

PREP TIME	COOK TIME	YIELD
20 minutes - 1 hour	5 days - 5 weeks or longer	30+ servings

3 pounds cabbage (1 large head or 2 smaller heads)

4½ tablespoons unrefined sea salt, pink, pickling, or other non iodized salt

1. Peel a few of the outer leaves from each head and set aside.
2. Slice the cabbage as thinly as possible using a food processor, mandoline slicer, or a knife.
3. Place the cabbage into a large bowl; if you don't have a bowl big enough for all 3 pounds, you can do this in batches. Sprinkle with salt.
4. Massage the cabbage with your hands to thoroughly distribute the salt and start the process of breaking down the cabbage. Massage until well wilted.
5. Make sure your fermentation crock or vessel is very clean. Pack the cabbage into the vessel, handful by handful, pressing down firmly with each handful to make sure it's tightly packed.
6. Place the large outer leaves over the top of the shredded cabbage. (You may have to tear or fold the leaves to be able to cover the entire surface. This ensures that the shredded cabbage stays submerged.
7. Weigh down the cabbage. A clean glass jar, slightly smaller in diameter than the mouth of your fermentation vessel, filled with water works well. If you are using a fermentation crock, use the weight that comes with it.
8. Cover the vessel with a breathable barrier (paint-straining bag, nut-milk bag, several layers of cheesecloth, coffee filter, linen towel, or even paper towels), making sure to secure with a rubber band (unless using something like a paint-straining bag that has an elastic around the opening). If using a fermentation crock, put on the lid.

Nutrivore Score

2071

Pickled Radishes

PREP TIME	COOK TIME	YIELD
15 minutes	8-24 hours	2 cups

2 cups thinly sliced radishes, about 10-12 radishes or ½ pound

1 teaspoon mustard seeds

1 teaspoon peppercorns

1 bay leaf

¾ cup apple cider vinegar

2 teaspoons sugar

2 teaspoons salt

1. Place sliced radishes, peppercorns, mustard seeds and bay leaf into a pint jar.
2. Mix vinegar, salt and sugar, and stir to dissolve.
3. Pour vinegar mixture over radishes. Fill the jar with water up to the very brim. Place the lid on the jar and shake well.
4. Leave on the counter for at least 8 hours, 24 is better. Refrigerate for long-term storage.

COOKING TIP

TIP: You can use your typical red radish most commonly found at the grocery store, but daikon radishes are also delicious pickled!

Nutrivore Score

439

Bacon Braised Kale

PREP TIME	COOK TIME	YIELD
5-10 minutes	15 minutes	2-4 servings

3 ounces bacon

1 large bunch kale, tough stems removed and chopped

¼-½ cup broth

1 tablespoon fresh lemon juice

1 clove garlic, minced

Salt, to taste

1. Chop the bacon into small pieces and place in a cold skillet. Heat over medium high heat, stirring occasionally, until bacon is crispy. If bacon releases a lot of fat, drain enough to leave 2-3 tablespoons in the pan.
2. Add kale and 2 tablespoons of broth. Stir relatively frequently. Add another 2 tablespoons of broth and cook, stirring occasionally until broth evaporates. Continue until kale is cooked to your liking.
3. Add crushed garlic and lemon juice. Stir and serve.

COOKING TIP

TIP: You can use this method to cook any leafy cruciferous vegetable like collard greens, mustard greens, cabbage, and even Brussels sprouts. Simply adjust the amount of broth and cooking time as needed for the vegetables to be fully cooked to your liking.

Nutrivore Score

630

Butter Poached Kohlrabi

PREP TIME	COOK TIME	YIELD
10 minutes	20 minutes	3-4 servings

3 medium kohlrabi

4 tablespoons butter or other fat of choice

¼ teaspoon salt, to taste

1 tablespoon fresh sage, chopped

1. Peel kohlrabi and chop into half inch cubes.
2. Heat butter in a skillet over medium heat. Add kohlrabi and cook, stirring occasionally, until kohlrabi is cooked al dente, about 15 minutes.
3. Add salt and sage. Stir and cook for 2 more minutes.

Nutrivore Score

566

Japanese Turnips with Orange Rosemary Pan Sauce

PREP TIME	COOK TIME	YIELD
15 minutes	15 minutes	3-4 servings

1 pound Japanese turnips, thinly sliced

2 large oranges

1 tablespoon fresh rosemary, chopped

3 tablespoons butter, or fat of choice

¼ teaspoon salt, plus more to taste

1. Using a microplane grater, finely grate peel from one or both oranges to get 1 tablespoon of orange zest. Juice both oranges.
2. Heat skillet over medium-high heat and add butter.
3. Add turnip slices and saute, stirring frequently, until they start to brown, about 3-4 minutes.
4. Add half of the orange juice, rosemary and salt. Continue to cook, stirring relatively frequently, until turnips are browned and fully cooked (soft but not mushy), about 10-12 minutes.
5. Add remaining orange juice and salt, stir to form a sauce then immediately remove from heat and serve.

SAUCES

Nutrivore Score

375

Arugula Pesto

PREP TIME	COOK TIME	YIELD
10 minutes	10 minutes	1 cup

6 cloves garlic, unpeeled
4 cups fresh arugula
¼ cup roasted pine nuts
⅓ cup parmesan cheese
2 teaspoons lemon juice
½ teaspoon salt
¼ cup extra virgin olive oil

1. Heat a skillet over medium heat. Add garlic to the pan, still in its peel. Stir or shake the pan frequently so the garlic rotates and cooks on all sides. Cook until garlic is starting to brown and is feeling soft to the touch, about 7-8 minutes.
2. Let the garlic cool, then peel. Place in a blender or food processor with the arugula, pine nuts, parmesan cheese, lemon juice and salt. Pulse until combined.
3. While the blender or food processor is running, slowly drizzle in the olive oil. Blend until desired consistency is reached.

COOKING TIP

TIP: Typically the fresher your ingredients are the better. However, this recipe is a great way to use up arugula that is starting to turn. So if your arugula is past the point where it seems appetizing for use in a salad, make this pesto instead!

Nutrivore Score

1142

Cauliflower Gravy

PREP TIME	COOK TIME	YIELD
5-10 minutes	20 minutes	3 cups

½ head cauliflower, cut into florets

1 ½ cups bone broth (chicken, beef, pork, etc.)

1 clove garlic

Salt, to taste

1. Place the cauliflower in a saucepan with the broth and garlic. Bring to a boil, then reduce the heat to maintain a simmer. Simmer for 15 to 20 minutes, until the cauliflower is overcooked.
2. Pour the mixture into a high-speed blender. Cover the lid of your blender with a tea towel to make sure you don't burn yourself. Blend for 1 minute, until completely smooth. Taste and season with salt if desired. If too thick, thin with additional broth or water.

COOKING TIP

TIP: Serve with roasted chicken or turkey or with any other recipe that you'd typically serve with gravy.

ENTRÉES

Nutrivore Score

376

Cashew Chicken

PREP TIME	COOK TIME	YIELD
10-15 minutes	20 minutes	4-6 servings

3 tablespoons avocado oil, or fat of choice

3 cloves garlic, minced

2 teaspoons fresh ginger, finely chopped

2 pounds chicken thigh or breast, chopped into half inch pieces

8 ounces mushrooms, sliced

5 ounce can sliced bamboo shoots, drained and rinsed

5 ounce can sliced water chestnuts, drained and rinsed

8 ounces whole raw cashews (about 1 ½ cups)

4-6 bunches bok choy (or tatsoi, pak choi or similar vegetable), about 1 ½ pounds or 14-16 cups chopped

1 cup broth, divided

1 teaspoon coconut water vinegar or apple cider vinegar

2 teaspoons salt to taste

2 tablespoons arrowroot powder

1. Heat a wok or large saute pan over medium-high heat. Add oil, garlic and ginger, and cook until fragrant, about 1 minute.
2. Add chicken and cook, stirring frequently, until cooked through, about 5-8 minutes.
3. Add mushrooms, bamboo shoots, and water chestnuts. Cook 3-4 more minutes, stirring frequently, until mushrooms are mostly cooked.
4. Add bok choy, cashews and ½ cup broth. Cook until greens start to wilt, about 3-4 minutes, stirring frequently.
5. In a small bowl, mix arrowroot powder, vinegar and salt with remaining ½ cup broth to make a slurry. Add the slurry to the wok and stir until thickened, about 2 more minutes.

Nutrivore Score

496

Pesto Chicken Collard Wraps

PREP TIME	COOK TIME	YIELD
15 minutes	none	4 wraps

½ bunch collard greens, about 3-4 leaves

½ batch arugula pesto (about ½ cup) (see pg 32)

1 pound chicken breasts or thighs, cooked and shredded or cubed (or use a rotisserie chicken)

1. Rinse the collard leaves and then lay them flat to dry.
2. Place a collard leaf upside down on a cutting board. With a small paring knife, remove the part of the stem that extends beyond the leaves. Shave the thicker parts of the stem that remain by running the knife perpendicular to the stem in order to make the leaf flat.
3. Add remaining ingredients to a large bowl and stir to combine.
4. Add the pesto chicken to the middle of each leaf. Fold the top and bottom edges in and then roll like a burrito, making sure all the filling stays inside.
5. Cut in half and serve.

COOKING TIP

TIP: Do you prefer a more traditional sandwich over a wrap? That's great! But don't skip the collard leaves! Use the collard leaves as you would lettuce in your sandwich to get the additional nutrients (and delicious crunch!) from this cruciferous veggie.

About the Creators of this Book

Dr. Sarah Ballantyne, PhD

FOUNDER OF NUTRIVORE

Award-winning public speaker, New York Times bestselling author and world-renowned health expert, Dr. Sarah Ballantyne, PhD believes the key to improving public health is scientific literacy. She creates educational resources to help people improve their day-to-day diet and lifestyle choices, empowered and informed by the most current evidenced-based scientific research.

Charissa Joy, AOS

CHIEF OPERATIONS OFFICER

Charissa Joy has over 15 years of experience working in the wellness space. Charissa has many roles on the team. She is Dr. Sarah's right hand womanand touches every part of Dr. Sarah's businesses. She manages all communications for Nutrivore, both external and internal. She is the project and team manager. She handles all marketing internal and external marketing, as well as all brand/affiliate partnerships.

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Nicole Anouar has a B.A in graphic design from the University of San Francisco and specializes in branding and educational design for healers and health professionals in the online space. With 8+ years of education and practice in graphic design, content marketing and ancestral lifestyle tradition, Nicole expresses her passion for truth and her love for alternative living into the work she does every day.

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CONTENT CREATOR AND PHOTOGRAPHER

Kiersten is a Content Creator for Nutrivore with a focus on recipe creation, practical resources and food photography, with a little writing on the side. After experiencing full body healing with the help of Dr. Sarah's and others' work, she now enjoys finding and creating beauty both in her work for Nutrivore and in her home as she raises two daughters alongside her military husband.

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Denise is a health researcher and author of the best-selling book, "Death By Food Pyramid"—an award-winning exposé of the forces that shaped our dietary guidelines and beliefs, and that's been featured in documentaries, UPenn medical writing curricula, the Nutritional Therapy Association certification program, and numerous other health education courses around the world.

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Lisa Hunter, MSc

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Lisa has a Bachelor of Science degree in Chemistry and Biochemistry, a Master of Science degree in Biochemistry, and worked in the pharmaceutical industry developing bio-products for 7 years, prior to taking time off to raise her two children.

On Nutrivore.com she is a researcher, writer, and content creator and is responsible for developing and maintaining the expanded Nutrivore Score database of over 7,500 foods (plus many of the nerdy puns sprinkled throughout the website!).

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