

Why Organic Mustard Seed Powder Is an Essential Kitchen Staple

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STORY AT-A-GLANCE

- › Mustard seed contains compounds that inhibit cancer proliferation. It also contains compounds that augment the cancer-fighting potential of other cruciferous veggies, delivering a double punch when combined
- › For this reason, I recommend keeping organic mustard seed powder in your kitchen at all times. Mustard seed powder can also be used to whip up homemade topical remedies, such as plasters and baths to relieve pain
- › A compound found in brown mustard seed lowered the risk of bladder cancer by 34.5% and was 100% effective at preventing the spread of cancer into surrounding muscle cells
- › The enzyme myrosinase is critical for the conversion of glucosinolates into isothiocyanates – chemoprotective compounds. While all cruciferous veggies contain some myrosinase, you significantly boost conversion by eating them together with a particularly myrosinase-rich food such as mustard seed powder
- › Cooking can also affect the health benefits of cruciferous vegetables. To maximize health benefits of broccoli, steam it for three to four minutes. Do not go past five minutes

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A number of foods have known anticancer activity. Among the more well-known are members of the cruciferous family, with broccoli leading the pack when it comes to

undergoing scientific investigation. One of the lesser-known ones is mustard seed, which also belongs to the brassica genus.^{1,2}

As it turns out, not only does mustard seed contain compounds shown to inhibit cancer proliferation, it also contains compounds that augment the cancer-fighting potential of other cruciferous veggies, delivering a real double punch when combined. For this reason, I recommend keeping organic mustard seed powder in your kitchen at all times. Mustard seed powder can also be used to whip up homemade topical remedies, such as plasters and baths to relieve pain.

Mustard Seed Compound Effectively Blocks Bladder Cancer Progression

One 2010 study³ discovered a compound found in both **brown mustard** and cruciferous vegetables called allyl isothiocyanate (AITC), also known as mustard oil, lowered the risk of bladder cancer by 34.5% and was 100% effective at preventing the spread of cancer into surrounding muscle cells. The complete stop of cancer progression is quite remarkable considering the cancer metastasized into surrounding tissues 71% of the time in untreated controls.

Importantly, the whole food – mustard seed powder – was more effective than the purified form. Dry mustard seed contain a compound called sinigrin, a precursor to AITC. When combined with water (which is what happens in your stomach), an enzyme called myrosinase converts the sinigrin into AITC.

A related form of this enzyme is found in the human digestive tract, but the plant-based one is far more effective, accomplishing a more complete conversion. This is likely why the whole food worked better than the isolated compound.⁴

Another interesting finding was that higher doses were not more effective. Animals given 71.5 milligrams (mg) of mustard seed powder per kilo of body weight were the ones in which cancer occurrence was reduced by 34% and metastasis completely blocked.

In animals treated with 715 mg of mustard seed powder per kilo, tumor growth was reduced by just 23%, and tumor invasion still occurred up to 62% of the time. So, a little can go a long way! Other studies have made similar findings. As reported by Natural Society:⁵

"A similar conclusion was found by Dr. Anthony Di Pasqua, a bioinorganic chemist at the University of North Carolina and his colleague Dr. Fung-Lung Chung from Georgetown University. Their studies support Bhattacharya's conclusions about AITC is brown mustard seed.

Dr. Di Pasqua said:⁶ 'Our studies have shown that, once inside the cell, ITCs [isothiocyanates⁷] bind to proteins and that protein binding affinities are closely associated with the ability to induce apoptosis (cell suicide).'"

Myrosinase Is the Key to Maximizing Chemoprotective Effects of Cruciferous Veggies

ITCs are derivatives of sulfur-containing compounds called glucosinolates, found in cruciferous vegetables. Different glucosinolates hydrolyze into different ITCs. Broccoli, for example, is high in glucoraphanin, a glucosinolate precursor to sulforaphane, which has well-established chemoprotective effects.^{8,9} Sulforaphane also helps improve **blood pressure**, heart health¹⁰ and kidney function.

Scientists believe sulforaphane's benefits are related to improved DNA methylation, which is crucial for normal cellular function and proper gene expression, especially in the easily damaged inner lining of the arteries (endothelium). Broccoli, like mustard seed, also contains sinigrin, the precursor to AITC. As mentioned, glucosinolate hydrolysis is catalyzed by a class of enzymes called myrosinase. Plant sources known to be particularly high in myrosinase include:

Mustard seed	Garden cress	Wasabi
Daikon radish	Horseradish	Arugula

To reiterate, the enzyme myrosinase is critical for the conversion of the various glucosinolates into isothiocyanates (ITCs)^{11,12} – the compounds that ultimately provide you with health benefits such as chemoprotection – and, while most if not all cruciferous veggies do contain some myrosinase, you can significantly boost the conversion by eating cruciferous vegetables together with a particularly myrosinase-rich food.

Doing so is a simple way to really maximize the chemoprotective effects of these vegetables. Wasabi, for example, has been shown to increase the chemoprotective effects of cruciferous vegetables by as much as 40%.¹³

Mustard seed appears to be the most effective, however, as it contains a particularly resilient form of myrosinase. Research confirms mustard seed can boost sulforaphane formation even in boiled broccoli, which is typically not recommended as boiling prevents sulforaphane formation by inactivating the myrosinase in the broccoli.¹⁴

ITCs Also Increase Levels of Master Antioxidant in Your Body

Once ITCs are absorbed, they turn into glutathione in your liver. Known as your body's most powerful antioxidant, glutathione is a tripeptide found in every single cell in your body. It is called "master antioxidant" because it is intracellular and has the unique ability of maximizing the performance of all the other antioxidants, including vitamins C and E, CoQ10, alpha-lipoic acid, as well as the fresh vegetables and fruits that you eat.

Glutathione's primary function is to protect your cells and mitochondria from oxidative and peroxidative damage. It is also essential for detoxification, energy utilization and preventing the diseases we associate with aging. Glutathione also eliminates toxins from your cells and gives protection from the damaging effects of radiation, chemicals and environmental pollutants.

Add Mustard to All Cruciferous Veggies

AITC is found in all cruciferous vegetables, not just mustard. Here's a list of vegetables that belong to this important family.¹⁵ Adding one or more of these foods to your diet each week may go a long way toward lowering your cancer risk. And, remember, to really boost the chemoprotective effects of these cruciferous veggies, be sure to add some mustard seed powder or other myrosinase-rich food (see earlier list).

Arugula	Bok choy	Broccoli
Broccoli rabe	Broccoli Romanesco	Brussels sprouts
Cabbage	Cauliflower	Chinese broccoli
Chinese cabbage	Collard greens	Daikon
Garden cress	Horseradish	Kale
Kohlrabi	Komatsuna	Land cress
Maca	Mustard (leaves and seed; brown, green, white and black)	Mizuna
Radish	Rutabaga	Tatsoi
Pak choy	Turnips (roots and greens)	Wasabi
Watercress		

Cooking Also Affects Anticancer Potential of Cruciferous Vegetables

Another factor that can affect the health benefits of cruciferous vegetables to a significant degree is the way you cook them. Studies have not been done on every single member of this family, but research clearly demonstrates there's an ideal way to prepare and eat mature broccoli.

In the video above, Elizabeth Jeffery, Ph.D., a researcher and professor in the department of food science and human nutrition at the University of Illinois, delves into this research,¹⁶ which shows that steaming your broccoli for three to four minutes is ideal. Do not go past five minutes. While I normally recommend eating most of your vegetables raw, mature broccoli and some other cruciferous vegetables are exceptions to this rule.

When you eat raw mature broccoli, you only get about 12% of the total sulforaphane content theoretically available based on the parent compound. Steaming your broccoli spears for three to four minutes will optimize the sulforaphane content by eliminating epithiospecifier protein – a heat-sensitive sulfur-grabbing protein that inactivates sulforaphane – while still retaining the enzyme myrosinase, which converts glucoraphanin to sulforaphane.

Again, without myrosinase, you cannot get any sulforaphane. Boiling your broccoli past the one-minute mark is not recommended, as it will destroy a majority of the myrosinase. If you want to boil your broccoli, blanch it in boiling water for no more than 20 to 30 seconds, immerse it in cold water to stop the cooking process, and be sure to add some mustard seed powder to your dish.

Cauliflower also contains sulforaphane. Boiling or blanching cauliflower causes the greatest loss of antioxidants,¹⁷ so steaming appears to be your best bet for cauliflower as well. Unfortunately, while research has identified the ideal steaming times for broccoli, the same has not been identified for cauliflower specifically, but it is likely similar to broccoli's.

Moreover, research¹⁸ reveals different varieties of cauliflower respond differently to various levels of heat and cooking times.

Broccoli Sprouts – Grow Them at Home and Eat Them Raw

Broccoli SPROUTS, on the other hand, are best eaten raw, and are an excellent alternative if you don't like the taste or smell of mature broccoli.

Sprouted broccoli seeds are also far more potent, nutritionally speaking, than mature broccoli, so you don't need to eat nearly as much to reap the clinical benefits from key therapeutic compounds. Research shows that even small quantities of broccoli sprout extract have the power to markedly reduce the size of rat mammary tumors induced by chemical carcinogens. As noted by researchers at Johns Hopkins University:^{19,20}

"Three-day-old broccoli sprouts consistently contain 20 to 50 times the amount of chemoprotective compounds found in mature broccoli heads, and may offer a simple, dietary means of chemically reducing cancer risk."

Broccoli sprouts are easy and inexpensive to grow at home. Growing your own is also the best way to ensure the active ingredients in the sprouts have not been destroyed by processing. Commercially available broccoli sprouts are typically heated in order to kill off harmful bacteria. However, use of high heat may also render the sprouts worthless, as it will negatively affect the conversion of glucosinolates to ITCs.

A study²¹ evaluating ways of eliminating microbial contaminants on broccoli sprouts found treating the sprouts with high pressure could kill off bacteria while leaving heat-sensitive nutrients intact. What's more, the pressure treatment actually boosted glucosinolate to ITC conversion. As reported by Science Daily:²²

"Results showed that processing broccoli sprouts at 400 to 600 megapascals increased the amount of glucosinolates that turned into isothiocyanates. Up to 85 percent of glucosinolates were converted under high pressure processing, boosting the plants' potential health-promoting compounds."

The rate of conversion for mild heat treatment at 60 degrees Celsius was 69 percent. Isothiocyanate levels in boiled samples were undetectable or not

quantifiable. Thus, the researchers say high pressure could be a preferred method over heating for processing broccoli sprouts."

Other Medicinal Uses for Mustard Seed

Getting back to mustard seed, powdered mustard seed actually has a long history of use, especially in Ayurvedic medicine, where it was used topically to improve blood circulation and detoxification.

Taken internally, 1 teaspoon of mustard seed powder twice a day can be used as a remedy for constipation. Mustard plaster and mustard baths were also common folk remedies for muscle and joint pain. Part of the pain-relieving effect is due to the mustard seed's high magnesium and selenium content.

You can easily recreate such remedies today using inexpensive household ingredients. For a soothing, pain-relieving mustard bath, fill your tub with warm water. In a glass jar, mix together the following ingredients, then add to your bath and soak.²³

Ingredients

- 1/4 cup baking soda
- 1 tablespoon mustard powder
- 1 or 2 drops wintergreen or peppermint essential oil
- 1 or 2 drops rosemary essential oil
- 1 or 2 drops eucalyptus essential oil

Take-Home Message

There are a number of take-home messages here. First, as a group, cruciferous vegetables are known to have a wide range of health benefits, including the quelling of

inflammation and prevention of cancer, and the list of cruciferous vegetables is far longer than most people realize. This means you have plenty to choose from should broccoli, cauliflower or Brussels sprouts fail to tantalize your taste buds.

Secondly, cruciferous veggies contain several different chemoprotective compounds, but they require the enzyme myrosinase to work. Not only do some cruciferous vegetables contain higher amounts of this critical enzyme, but preparation and cooking can greatly affect its activity, and therein lies the problem.

After all, some veggies – Brussels sprouts, for example – are not particularly delectable raw. So, the question is, how do you cook these foods without forgoing the health benefits?

To recap, your best bet for many cruciferous veggies is to lightly steam them and eat them in combination with a myrosinase-rich food. Mustard seed is the most potent. Doing this is a "hack" that basically gives you the benefit of raw food even though it's been lightly cooked. But there's yet another trick, presented by Dr. Michael Greger in the video below,²⁴ which he dubs the "hack and hold" technique.

One More Cooking Trick to Boost Sulforaphane Content

When a cruciferous vegetable is chopped, the myrosinase is activated. So, by chopping the food and waiting about 40 minutes, the sulforaphane will have formed, allowing you to cook the food (in excess of the recommended three to four minutes of steaming) without risking sulforaphane loss.

The reason for this is because both the precursor to sulforaphane and the sulforaphane itself are largely resistant to heat. It's the myrosinase that gets destroyed during cooking, which then prevents the formation of sulforaphane.

By allowing the sulforaphane to form before you cook it, you circumvent this chain of events. An example given by Greger is the making of broccoli soup. When making the soup, you'll want to blend the raw broccoli first; wait 40 minutes for the sulforaphane to form, then boil it.

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