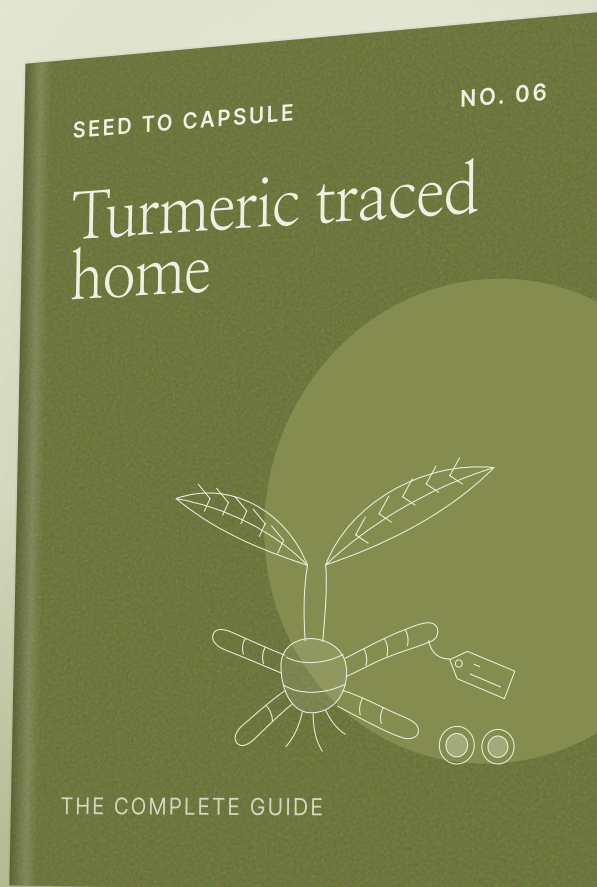




SOURCING GUIDE · ORIGINS

Compare turmeric powders and extracts by paperwork

This guide is for careful buyers who want to tell ground root powder from standardised curcuminoid extract. After reading it they will be able to compare labels, assays and origin paperwork with confidence.

- **Powder range**
Dry powder holds only 2 to 9 percent curcuminoids by weight.
- **Extract strength**
Standardised extracts reach around 80 to 95 percent curcuminoids.
- **Paper trail**
Batch assays and heavy metal results matter more than colour.

By Dana Kessler · Updated Aug 31, 2026 · 8 min read

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A jar of turmeric looks simple on the shelf. The powder inside may have travelled from a monsoon field in India through sun, dryers, grinders and labs before it reached encapsulation. Once the differences in drying, curcuminoid content and testing are clear, colour and story stop deciding the purchase.

01

From field to dried rhizome

Turmeric is *Curcuma longa* L., a perennial plant with underground rhizomes in the Zingiberaceae family. It is cultivated as an annual crop in tropical and subtropical regions, particularly in India and China. India remains the major producer, which is why so many origin papers point back there.

Harvest happens at maturity, when the leafy tops die back and the rhizomes hold their full weight. Growers lift finger and mother rhizomes from the soil, wash off earth, then boil, slice or polish them according to local practice. Slicing matters because thin pieces dry faster and more evenly than whole fingers.

Fresh rhizomes have high initial humidity of 70 to 80 percent. One composition summary puts water at 80 to 90 percent, followed by carbohydrates around 13 percent, proteins 2 percent, minerals 2 percent and lipids under 1 percent. That water makes fresh weight heavy and perishable.

Drying reduces moisture to inhibit enzymes, microorganisms and unwanted reactions and to lower transport costs. Trade is therefore in dried form, either as whole dried fingers, ground powder or material for extraction. A lot that stays damp risks mould and uneven quality long before it reaches a capsule plant.

02

How drying shapes colour and curcumin

Drying is not only about removing water. Heat, light, air and time change colour, phenolic content, curcumin content and essential oil yield. A six method comparison tested sun drying, convection oven drying, vacuum oven drying, infrared drying, microwave drying and freeze

drying on 3 mm turmeric slices.

In that comparison freeze drying gave the brightest yellow colour, the lowest browning index of 17.07, total phenolic content of 78.90 mg GAE per g, curcumin content of 3.83 percent and essential oil yield of 4 percent. Low temperature and absence of light preserved both pigment and volatile oil. The equipment cost keeps this method rare for bulk spice.

Sun drying is the most widely used technique. It has extended duration, non uniform quality and risk of microbial attack. The most significant reduction in curcuminoids was attributed to UV induced degradation. Long exposure in open yards fades pigment while moisture leaves slowly.

Other heated methods sit between those poles. Convection, vacuum, infrared and microwave drying shorten time and reduce microbial risk compared with open sun. Each applies heat in a different way, so colour retention and oil recovery vary by temperature, pressure and slice thickness. Buyers rarely see the dryer type on a retail label, but bulk suppliers should know it.

FROM THE EDITORS

Colour is a poor guide to strength. Bright yellow can reflect careful drying, added colour or simply varietal difference, while a duller powder can still assay within its expected curcuminoid range. Ask for the assay, not a colour story.

03

What is inside ground root powder

Ground root powder keeps the whole rhizome matrix. That includes carbohydrates, protein, minerals, fibre, volatile and fixed oils, plus the yellow pigments called curcuminoids. Whether the full root matrix with turmerones and oils performs differently from isolated curcuminoids is not clearly proven.

Curcuminoids may compose up to 10 percent of dry turmeric powder. The combination is mainly curcumin, demethoxycurcumin and bisdemethoxycurcumin, found between 2 and 9 percent in turmeric. Another description puts whole root powder at about 2 to 8 percent curcuminoid by weight, while a culinary summary notes about 3 to 8 percent curcumin depending on growing season.

The arithmetic is modest. An average 3 g dessert spoon of powder contains an average of 30 to 90 mg of curcumin. Culinary use is commonly about 0.5 to 3 g powder per day in food. Food use therefore delivers tens of milligrams, not the hundreds of milligrams used in extract trials.

Laboratory methods can quantify curcumin, demethoxycurcumin and bisdemethoxycurcumin. One evaluation from six places in India extracted 15 g samples in a Soxhlet with 150 mL ethylene dichloride at 70 degrees C for 6 hours, then measured total curcuminoids by absorbance near 420 nm and individual curcuminoids by HPLC. UV absorbance near 420 nm gives a total, while HPLC separates the three markers. Exact harvest months and regional percentages for any single jar require lot specific assay certificates.

04

How extraction concentrates curcuminoids

Curcumin is inherently hydrophobic and does not dissolve in water but dissolves in dimethyl sulfoxide, acetone, ethanol and oil. Water alone cannot pull much pigment from powder. Makers use organic solvents, heat and time to concentrate the markers.

Traditional solvent extraction recovery of curcumin using a 70 percent hydroethanolic solution reached 69.1 percent. Conventional isolation includes Soxhlet extraction with alcohol, hexane followed by acetone extraction, and hot ethanol filtration with kerosene and petroleum ether steps yielding orange needles of recrystallized curcumin. These are laboratory and factory routes, not kitchen methods.

Yield depends on solvent, temperature, flow and time. Ethanol modified subcritical water extraction at 90 degrees C, 4 mL per min and 25 wt percent ethanol gave an extraction yield of 4.12 wt percent dry basis, higher than Soxhlet at 2.71 wt percent and ultrasound assisted and conventional solvent extraction near 0.85 wt percent. Small changes in conditions shift how much curcuminoid leaves the matrix.

Common supplement extracts are standardized to around 80 to 95 percent total curcuminoids. Whole root powder at 2 to 8 percent and extracts up to 95 percent sit far apart. A 500 mg capsule at 95 percent holds about 475 mg curcuminoids, while 500 mg of 3 percent powder holds about 15 mg. Enhanced absorption formats complicate dose comparison because the same milligram amount can behave differently across technologies.

05

Why labels add pepper and lipids

Curcuminoid extracts face a separate issue after concentration. Absorption is poor and metabolism is rapid, so formulators add piperine from black pepper or pair curcuminoids with fats and phospholipids. The label tells which path a brand chose.

In a human study adding 20 mg piperine to 2,000 mg curcumin increased measured bioavailability by about 2,000 percent. Piperine inhibits UDP glucuronosyltransferase enzymes and P glycoprotein, slowing curcumin metabolism and reducing efflux from intestinal cells back

into the gut lumen. Slower conjugation in the liver and gut wall leaves more parent compound in circulation for a time.

Lipid formats use a different logic. Because curcumin dissolves in oil, makers disperse extract in oils, micelles, liposomes or phospholipid complexes. The goal is to present a hydrophobic powder in a fat friendly form. Trial labels, patents and marketing names vary, which makes milligram to milligram comparison difficult without human data on that exact format.

Dose ranges reflect that gap between kitchen and capsule. Knee osteoarthritis trials commonly use about 500 to 1,500 mg per day of curcuminoid extract. Kitchen use stays near 0.5 to 3 g powder per day in food. Higher potency is not automatically safer because liver injury reports are linked especially to products designed for higher absorption. Long term safety of high dose enhanced absorption products beyond a few months of trial use is not established.

FROM THE EDITORS

Home water and palm tests for adulteration appear in blogs but are not laboratory assays for lead or curcuminoid content. Use them as curiosity, not proof, and request a certificate of analysis for the lot.

06

Safety screening and origin paperwork

Ground spice carries risks that extracts can partly avoid and partly inherit. Soil, water, drying yards and grinding equipment can add heavy metals. Colour adulteration is a separate and deliberate problem.

Lead chromate, a toxic yellow pigment, is deliberately added by some suppliers to intensify turmeric powder colour, particularly in mass distribution chains. A 2014 Harvard University study found lead concentrations up to 483 ppm in turmeric from 18 households in rural Bangladesh, where the allowable level is 2.5 ppm. Stanford researchers did not find evidence of contaminated turmeric beyond Bangladesh and noted stricter import checks led many large scale Bangladesh processors to stop or limit lead chromate use.

Pesticide residues are a concern in ground spice, but levels for this jar are not quantified. That gap matters for households buying for a partner, child or parent. Origin paperwork can narrow the uncertainty even when it cannot remove it.

Purity can be checked through USDA Organic certification, NSF or USP testing, and independent analysis from ConsumerLab or Labdoor, with a need to seek batch specific heavy metal results. Organic speaks to growing practice, while NSF, USP, ConsumerLab and Labdoor

speak to testing programs with different scopes. None replaces a lot specific certificate of analysis.

Ask the brand for the lot number on the bottle, the country and region of origin, the drying method where known, the assay method and result for total curcuminoids, the HPLC breakdown of the three markers for extracts, and the heavy metal panel with limits. A founder who can name growers and show paperwork earns trust. A missing paper does not prove a bad product, but it leaves the chain opaque.

07

The checklist

- ☐
 Match the format to the need: root powder for food, standardised extract for measured curcuminoids
- ☐
 Read total curcuminoids as a percentage, not colour or story
- ☐
 Look for all three markers: curcumin, demethoxycurcumin, bisdemethoxycurcumin
- ☐
 Do the concentration arithmetic per capsule and per daily serving
- ☐
 Note piperine amount where listed, often near 20 mg in studies
- ☐
 Note lipid or phospholipid format and avoid cross brand milligram claims
- ☐
 Check Supplement Facts and other ingredients for solvents, oils and pepper
- ☐
 Ask for lot specific certificate of analysis with assay method
- ☐
 Request batch specific heavy metal results including lead before you buy.
- ☐
 Look for USDA Organic plus NSF, USP, ConsumerLab or Labdoor testing
- ☐
 Record origin country, harvest lot and drying method when available
- ☐
 Keep high absorption products cautious and discuss them with a clinician

Sources and further reading

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- Evaluation of Curcuminoids in Turmeric Rhizome (*Curcuma Longa* L.) Collected from Different Places in India · biotech-asia.org
- Different Methods of Isolation of Curcumin · biosmartnotes.com

For information only, not medical advice. Statements about supplements have not been evaluated by the Food and Drug Administration, and no product here is intended to diagnose, treat, cure or prevent any disease. Ask a doctor or pharmacist before starting a supplement, especially if you are pregnant, nursing or taking medication.



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Dana runs the news desk and the sourcing guides at Seed to Capsule. She files every certificate of analysis a brand sends her by lot number, and keeps a second list of the ones that never arrived.
