

## **Distribution, Botanical and Biological Characteristics of Sesame**

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**Abstract:** Sesame (*Sesamum indicum*) is a plant in the genus *Sesamum*, also called simsim, benne or gingelly. Numerous wild relatives occur in Africa and a smaller number in India. It is widely naturalized in tropical regions around the world and is cultivated for its edible seeds, which grow in pods. This article provides information on the distribution, botanical classification and biological description and varieties of sesame, which belongs to the oilseed group.

**Keywords:** oil crop, distribution, botanical classification, country, seed, producers, subspecies and varieties of sesame.

**DISTRIBUTION.** Sesame seeds are one of the most popular seeds in the world. The main reason for their popularity is the fact that they are loaded with health-promoting nutrients and elements. But besides the nutritional value, these seeds are also packed with flavor, crunchiness and a certain smokiness that helps them find use in many cuisines. The world produces about 3 million tons of sesame seeds every year on an average.

Sesame seeds are incredibly resilient and able to grow in places where many other crops cannot. These wonder seeds are a common ingredient in dishes across the globe such as bread meals, soups, crackers, and meat cuisines. About 60 to 65 countries produce these seeds out of which Asian and African countries are the key sesame seeds producers. The following is a detailed description of the top 5 countries thriving as the leading sesame seeds producers in the world.

1. Myanmar– Myanmar is the leading sesame seeds producer in the world and produces 18.3% of the total sesame seeds produced on an annual basis. As far as the exact numbers are concerned, Myanmar produces 890000 metric tons of these seeds every year.
2. India– On the number 2 spot comes India which is also one of the leading exporters of sesame seeds. The country's tropical climate and large scaled crop area make it possible for it to produce 626000 metric tons of sesame seeds every year. This amount is about 13.1% of the total produce of these seeds on an annual basis.
3. China – Close behind India is China in this list of the top 5 sesame seed producers in the world. The country produces 12.8% of the total sesame seed amount and this amounts to 623492 metric tons.
4. Sudan– On the 4th spot of this list is Sudan which too is among the top sesame seeds producers and exporters in the world. The country produces 562000 metric tons of sesame in the world which is about 11.5% of the world's production.

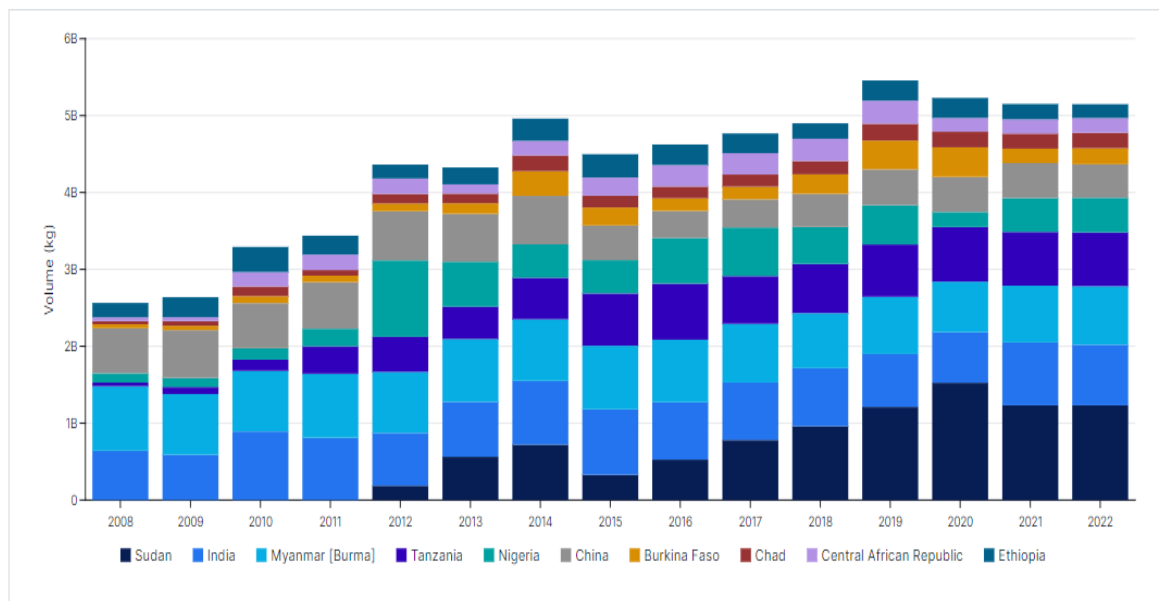
5. Tanzania– The 5th largest producer of sesame seeds in the world is Tanzania. This country produces close to 8.6% of the total sesame seeds produced by the world and this amount to about 420000 metric tons.

The top five sesame seeds producers produce about 70% of the total amount. Some of the other countries which too produce considerable amounts of sesame include Uganda, Nigeria, Bangladesh, Pakistan, Mexico and Thailand. The global sesame exports are estimated to be about 5 to 6 lakh tons wherein India, China and Mexico are the leading sesame seeds producers & suppliers.

Sesame seeds are exported in many forms and some of them include roasted, natural, hulled and in its oil form. There are many good and reputed sesame seed manufacturing and sesame seed exporting companies in India and one of them is HL Agro. This company produces close to 22000 metric tons every year!

### Trends of Top 10 Producers

This is the production trends of the top 10 producers of Sesame Seed from 2008 to 2022.



### Shares of Top 10 Producers

These are shares of top 10 producers of Sesame Seed in 2022.

Rank	Country	Country 2022	Production Quantity 2022	1-Year Growth in Qty 2021-2022	3-Year Growth in Qty 2019-2022	5-Year Growth in Qty 2017-2022
1	Sudan	18.28%	1.23B	0.00%	+1.79%	+57.71%
2	India	11.70%	788.74M	-3.44%	+14.42%	+5.58%
3	Myanmar (Burma)	11.29%	760.93M	+2.99%	+2.21%	-0.44%
4	Tanzania	10.39%	700M	0.00%	+2.94%	+12.90%
5	Nigeria	6.68%	450M	+2.27%	-11.76%	-28.83%
6	China	6.46%	435.30M	-4.41%	-6.79%	+18.77%
7	Burkina Faso	3.10%	208.80M	+11.99%	-44.28%	+27.48%
8	Chad	3.00%	201.91M	+2.54%	-7.25%	+27.22%
9	Central African Republic	2.83%	190.92M	+3.00%	-36.65%	-31.48%
10	Ethiopia	2.67%	180M	-10.00%	-31.47%	-29.66%

**BOTANICAL CLASSIFICATION.** Sesame cultivated Indian – *Sesamum indicum* L. is an annual plant of the Sesame family (*Pedaliaceae*). Sesame has taproot, penetrating to a depth of 1 m, and its upper part is branched and rather thick.

Stem is erect (sometimes there are bushes of sprawling form), height is 50-150 cm, branched, haired with fine hairs.

Leaves are petiolate, alternate or opposite, haired. The shape of the leaf depends on its position on the stem. In some varieties, all the leaves are whole, the lower ones are large and wide, they decrease upwards, in others – the lower leaves are dissected, while the upper ones are whole, narrow, and lanceolate.

Flowers of the five types consist of a tubular bell-shaped corolla and a small five-part calyx. One, sometimes three flowers sit in the leaf bosom. The color of the corolla, depending on the ecotype, varies from white to intense violet. Calyx and corolla are trimmed. Sesame is self-pollinator, but cross-pollination by bees is also possible.



Flower  
of *Sesame  
indicum*

Sesame seed  
capsule

Flowers and seed  
capsules on sesame  
plant

Sesame seeds are  
a rich source of oil

The fruit is an elongated four or octahedral box with a round base and a conical tip, which consists of two or four carpels. In some forms, the edges of the carpels are wrapped inward and form false partitions; in others, these partitions do not exist. When ripe, the boxes open, breaking up into carpels. At the same time, seeds fall off, especially easy for forms without partitions. Boxes are large (3-4 cm long) and small (up to 3 cm). There are 100-150 pieces on one plant.

Seeds are located in the nests of the box in the form of flat vertical columns – stacks in 4 or 8 rows. Seeds are small, weight of 1000 pcs. is 2.5-5 g. The shape is similar to flaxseed, flat, but with a matte surface, sometimes rough.

Sesame seeds occur in many colours depending on the cultivar. The most traded variety of sesame is off-white coloured. Other common colours are buff, tan, gold, brown, reddish, gray, and black. The colour is the same for the hull and the fruit.

Sesame fruit is a capsule, normally pubescent, rectangular in section, and typically grooved with a short, triangular beak. The length of the fruit capsule varies from 2 to 8 centimetres ( $\frac{3}{4}$  to  $3\frac{1}{8}$  in), its width varies between 0.5 and 2.0 centimetres ( $\frac{13}{64}$  and  $\frac{25}{32}$  in), and the number of loculi varies from four to 12. The fruit naturally splits open (dehisces) to release the seeds by splitting along the septa from top to bottom or by means of two apical pores, depending on the varietal cultivar. The degree of dehiscence is of importance in breeding for mechanised harvesting, as is the insertion height of the first capsule.

Sesame seeds are small. Their sizes vary with the thousands of varieties known. Typically, the seeds are about 3 to 4 mm long by 2 mm wide and 1 mm thick ( $\frac{15}{128}$  to  $\frac{5}{32} \times \frac{5}{64} \times \frac{5}{128}$ ). The seeds are ovate, slightly flattened, and somewhat thinner at the eye of the seed (hilum) than at the opposite end. The mass of 100 seeds is 0.203 g. The seed coat (testa) may be smooth or ribbed.

## SUBSPECIES AND VARIETIES OF SESAME.

Sesame is distinguished by a significant variety of forms and its systematics has been developed by different authors several times. The most complete classification of it made by V. M. Giltebrant, which took into account the morphological features, the distribution area and the biological characteristics of the plant. According to this classification, cultural sesame is divided into two subspecies:

1. *Sesamum indicum ssp. bicarpella-turn Hilt.* The box consists of two carpels, a convex rectangle in cross section. Corolla is accrete from five petals. The cup is five-fold. The stigma of the pistil is two-bladed.
2. *Sesamum indicum ssp. quadricar-pellatum Hilt.* The box consists of two carpels, with a convex rectangle in the cross section. Corolla is fused from five petals. The calyx is five-lobed. The stigma of the pistil is two-lobed.

The most common is a subspecies with two carpels. Within this subspecies there are groups of varieties: Asiatic – *proles asiaticum Hilt.*, and Abyssinian – *proles abyssinicum Hilt.*

Plants are of Asian group with medium power. The leaves at the bottom of the stem are whole or weakly dissected, medium in width, narrow at the top.

The plants of the Abyssinian group are powerful, the foliage is strong. Leaf blades are wide. The varieties of this group are more moisture-loving, relatively late-maturing and do not have wide industrial significance, with the exception of the regions of Transcaucasia.

It is a thermophilic and light-loving short-day plant, requiring clean and fertile soils. At the same time, it is drought-resistant and heat resistant. Seeds begin to germinate at a temperature not lower than 15-16°C. Shoots die during frosts of -1°C. Sesame stops growing at temperatures below 15°C. The optimum temperature is 22-25°C. The first 30-45 days of growing season it grows very slowly and weeds can cause damage during this period. The vegetation period, depending on the variety and crop conditions, ranges from 80 to 120 days.

**The best soils for sesame are black earth, light loam and sandy loam, sierozem.**

Sesame is a **annual** plant growing 50 to 100 cm (1 ft 8 in to 3 ft 3 in) tall, with opposite leaves 4 to 14 cm (2 to 6 in) long with an entire margin; they are broad lanceolate, to 5 cm (2 in) broad, at the base of the plant, narrowing to just 1 cm ( $1\frac{1}{32}$  in) broad on the flowering stem. The flowers are tubular, 3 to 5 cm ( $1\frac{1}{8}$  to 2 in) long, with a four-lobed mouth. The flowers may vary in colour, with some being white, blue, or purple.

### **Four Commonly Used Varieties of Sesame Seeds**

Sesame seeds are believed to have originated in India and date back to 1600 BC. Ever since they were first originated, they have proved to be excellent for human health. They are loaded with many useful nutrients and minerals which work for the body in many ways, preventing many health conditions and boosting the overall health. But since there are many different kinds of sesame seeds, the benefits too may vary from variety to variety. India ranks amongst the major sesame seeds exporter around the world. This is why; we have brought to you a list of the four commonly used varieties of sesame seeds.

#### **Hulled Sesame Seeds**

This is one of the most common and healthiest varieties of sesame seeds. Hulled sesame seeds are basically those kinds of sesame seeds from which the outer husk or hull has been removed. While this process of removing the husk is practiced by many sesame seeds manufacturers, the process, machinery and skill used to do so may vary greatly. HL Agro is one of the best sesame seeds exporter and manufacturer of hulled sesame seeds, known for its high-quality hulling process.

## Unhulled Sesame Seeds

As the name suggests, unhulled sesame seeds are those kinds of sesame seeds whose hull or outer skin hasn't been removed. These seeds go through a step lesser during the manufacturing process as compared to hulled and are known to have higher benefits too. The outer skin is considered to be nutritious and thus this variety is used for many purposes and in many recipes across the world.



**Hulled vs. Unhulled Sesame Seed**



**Various Sesame Seeds**

## White/Natural Sesame Seeds

Another variety of sesame seeds that you must know about is the white sesame seed variety. White/Natural sesame seeds are considered to be those sesame seeds which are in their purest form. You must have seen these seeds sprinkled on top of burgers, donuts and other kinds of desserts and snacks. They have a very rich flavor and texture and are among the most commonly used sesame seeds in the world. Within the variety of white sesame seeds, both hulled and unhulled varieties can be found.

## Black Sesame Seeds

Black sesame seeds are also considered to be the most nutritional variety of sesame. Black Sesame Seeds The ancient Chinese believed that the nutrients present in the Black sesame seeds could cure many kinds of body infections which are caused due to aging, worrying, anxiety and others kinds of tolls in life. These seeds are loaded with zinc and calcium due to which they provide prevention of many health conditions that are caused due to aging. These seeds are mixed in yughurts and many kinds of dishes across the world. Black sesame seeds are further divided into two types-hulled black sesame seeds and unhulled black sesame seeds.

In the field of cultivation, sesame varieties are grown at different times, resistant to adverse weather conditions and diseases. The first variety, in which sesame seeds are not sprinkled, was created in 1955, 1958. Currently, sesame breeding is mainly carried out by the Ukrainian Institute of Oilseed Crops. The institute has created late-ripening and intermediate varieties of sesame. These light-colored, high-fat varieties are used in oil mills to produce sesame oil and in the confectionery industry in the food industry. In the Krasnodar region of the Russian Federation, in the Rostov region and in the southern regions of Ukraine, varieties VNIIMK-889, VNIIMK-81, Kuban-55, Odessky-539 are cultivated.

In Uzbekistan and Turkmenistan, the varieties Tashkent-122, Qora shakhzoda, Sarahs-470 and also the variety Ashgabat-122 are widespread. According to breeder N.D. Lunina, sesame varieties grown in Central Asian countries are distinguished by high yields and high yield of oil from the grain. The yield of these varieties averages from 1 hectare to 14-16 centners. Weight of 1000 grains is 3.5-3.9 grams. The yield of adapted sesame varieties (VNIIMK-889, VNIIMK-81, Kuban-55, Odessky-539) in the regions of Ukraine and the Russian Federation does not exceed 10-12 c/ha. Weight of 1000 grains is 2.3-2.6 grams.

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