# Solar Dryer

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## Comparative Study on Shade Drying, Sun Drying and Direct Solar Drying of Mint Leaves

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### ABSTRACT

*Aromatic herbs are in high demand in food processing industries, Cosmetics, biotechnology and pharmaceuticals. Mint leaves can be used as a flavoring agent in food; they are also valued for their antibacterial and antioxidant properties. Mints (Mentha spp.) are a well-known medicinal and aromatic plant. The mint leaves are used as fresh due to high moisture content. Drying helps to inhibit bacterial growth and decrease water activity. The purpose of this study was to enhance their shelf life and save packaging and shipping costs. A comparative study on the drying process of mint leaves was conducted under shade drying, sun drying and direct solar dryer. Fresh mint leaves were collected from the medicinal block of Krishi Vigyan Kendra Vaishali, Bihar, India. They were washed and the excess amount of water was removed from the surface of the leaves. The various parameters recorded hourly in the experiments were temperature and relative humidity inside and outside the direct solar dryer; the weight of the mint leaves was recorded hourly. Temperature plays a great impact in the drying process. The maximum temperature reached in solar drying up to 56° C as compared to 42° C in sun drying. The minimum relative humidity reached in the direct solar dryer was 17 percent as compared to 28 percent in sun drying.The drying curve data suggest that the drying displays a falling rate period. Henderson pabis model was fitted for drying processes in shade drying, sun drying and direct solar drying. The highest sensory score is reached with color (8.7), flavor (8.5), appearance (9) and overall acceptability (8.7) when dried in a Solar dryer.*

*To fabricate a low -cost environment friendly solar dryer is quite a challenging task. The solar dryer was built by locally available ply-wood and low- cost materials. The dryer consists of transparent glass, exhaust fan, wire mesh screen, solar cell. Another challenge is to use the maximum solar radiation inside the solar dryer. Inclination angle of the Transparent glass was made 15° to get maximum radiation.*

***Future scope**: World is suffering from harmful gases originated from burning of fossil fuels. Solar energy is a safer and cleaner energy source. Solar dryer can also reduce up to 34 % $CO_2$ emission. This study aims to maintain best sensory quality of dehydrated herbs and spices.it is also aiming for low -cost clean drying technology and sustainable development.*

***Keywords:** Medicinal herb, flavoring agent, sensory score, drying rate, mint leaves, moisture content, solar dryer, drying model.*

### INTRODUCTION

Mints (Mentha spp.) are a well-known medicinal and aromatic plant. The 25-30 species belong to the Lamiaceae family genus Mentha [4], the large family of perennial herbs [8] and grown all over the world. It has unique herbal qualities, such as antibacterial and antioxidant characteristics [8]. The creeping, uniform stems of this perennial herb have oval, rough-surfaced leaves with serrated margins.

Mint leaves are well-known aromatic, culinary, nutritive, and medicinal herbs that are widely cultivated. The few family of mint that are grown around the world such as Water mint (*Mentha aquatica*), gardenmint (*menthaarvensis*), Spearmint (*menthaspicata*), Peppermint (*menthapiperita*), horsemint (*menthalongifolia*), ginger mint (*menthagracilis*), pennyroyal (*Mentha pulegium*), and pine apple mint (*Mentha suaveolens*). It is used in the treatment of illnesses, particularly in sinus problems, rheumatism, hiccups, and flatulence[1] due to its medicinal value. Mint leaves have the properties of Refreshing, stimulant, stomachic, anti-asthmatic, diaphoretic, anti-septic, and anti-spasmodic. It has therapeutic and aromatic uses. Therapeutic use of mint leaves is a treatment of throat pain, joint pain, headache ,colds, fever, food poisoning, motion sickness,indigestion ,rheumatism and itching.

In addition to medicinal value, it serves a variety of culinary purposes. They can be used as fresh or dried. Mint leaves contain abundant of vitamins A and C, lot of calcium, potassium, iron, phosphorus and other nutrients. They have high moisture content (75 to 80 percent). Drying helps in preventing the growth of bacteria and reducing some unpleasant biochemical processes, makes utilized dried leaves. It is a standard method for removing water from agricultural products since ancient times. Dried leaves can be stored for a long time. It reduces the products' weight and volume [14].

Drying is highly beneficial preservation process to preserve seasonal plants and making it accessible to consumers all year

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