

# MICROGREENS: A NUTRIENT BOOST

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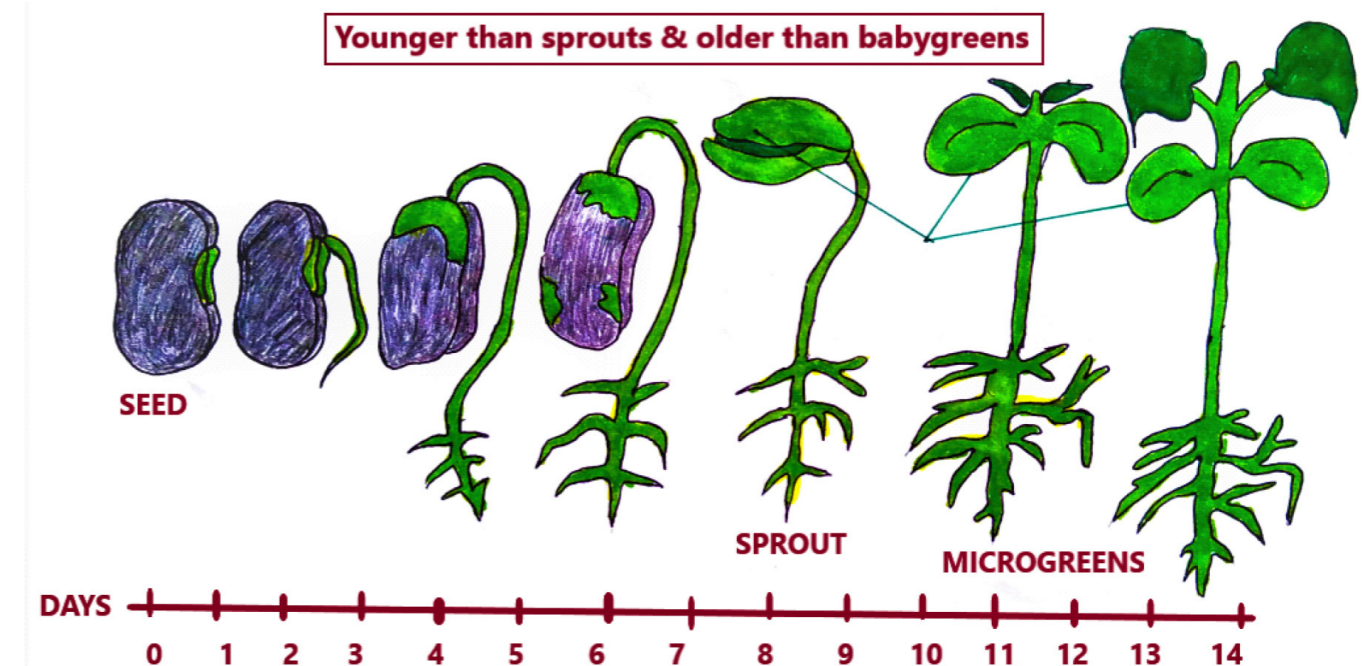
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The lifestyle changes associated with improved standard of living in terms of social, economic and cultural standards lead to major lifestyle associated problems including lifestyle and malnutrition disorders. The non-availability of fresh pesticide residues free vegetables for consumption is a big problem in the present-day scenario. Urban population is mainly dependent on long food chains, which begin from distant rural areas, limiting the availability of produce that has short shelf life and poor shipping ability. As a result, a large urban population resides in areas classified as food deserts, where people do not have ready access to fresh agricultural produce like fruits and vegetables, thus, they are suffering from disorders caused due to the deficiency of essential nutrients. Increased health consciousness associated with lifestyle changes has created globally a vast demand for functional food. Microgreens, also known as neogreens, young greens, or vegetable confetti, are an emerging special class of fresh produce with distinctive health benefits since these food articles are additionally a decent source of ready to available forms of amino acids, minerals and vitamins, thus, have gained popularity with chefs and consumers in recent past. Owing to their nutrient-dense properties, microgreens have recently attracted considerable attention of nutritionists, health professionals, educators and health-conscious individuals. In past decade, their culinary value has risen too high because of their high nutrients content, versatility, flavour profile and crisp texture imparted to the dish.

## WHAT ARE MICROGREENS?

The term microgreens has been given to the seedlings based on their stage of harvesting for consumption. Microgreens are very young and tiny seedlings of vegetables and herbs harvested after full expansion of cotyledonary leaves or just after the emergence or partial expansion or just before unfolding of the first pair of true leaves. It is different from sprouts in the sense that sprouts are the germinated seeds that are consumed with embryonic roots and seeds. However, microgreens are different from baby greens in their size and much smaller than baby greens. Their status remains in between sprouts and baby greens. The size of these microgreens varies from 2.5 to 7.6 cm in height, which usually occurs within 7 to 14 days after germination, depending on environmental conditions, crop and its variety. Microgreens include three basic parts, i.e., a central stem, two cotyledonary leaves and typically the first pair of very young true leaves. Microgreens are cut along with the stem and attached cotyledonary leaves using scissors or sharp edge knife. If left for a longer time, they will begin to rapidly elongate and lose their colour and flavour. Any species, seedlings of which have a desirable flavour and colour can be used as microgreens. The plant species commonly used for microgreens are amaranth (*Amaranthus viridis*), beetroot (*Beta vulgaris var. crassa*), broccoli

(*Brassica oleracea var. italica*), cabbage (*Brassica oleracea var. capitata*), celery (*Apium graveolens*), corn shoots (*Zea mays*), dill (*Anethum graveolens*), golden pea (*Pisum sativum var. saccharatum*), kale (*Brassica oleracea*), lettuce (*Lactuca sativa*), mustard (*Brassica juncea*), pepper cress (*Lepidium sativum*), radish (*Raphanus sativus*), red cabbage (*Brassica oleracea var. capitata f. rubra*), spinach (*Spinacia oleracea*), Swiss chard (*Beta vulgaris var. cicla*) etc.



## NUTRITIONAL COMPOSITION

For good health and wellness, adequate dietary intake of minerals is essentially needed, however, unfortunately, mineral malnutrition is still a worldwide concern and is considered one of the most serious global problems. Microgreens are cheaper and richer source of several micronutrients. They are higher in nutritional content than their mature parts. Their composition differs with the types of crop, growing medium, amount of sunlight, atmospheric temperature and the stage of harvesting. Bright-coloured microgreens are found to be more nutritious than the lighter ones. Microgreens have a higher content of protein, iron, zinc,  $\alpha$ -carotene,  $\beta$ -carotene, violaxanthin, lutein and neoxanthin in comparison of sprouts. It is interesting to know that antinutritional factors like nitrate ( $\text{NO}_3^-$ ) and nitrite ( $\text{NO}_2^-$ ) are also very low in microgreens. In recent years, edible greens have become a good source of dietary antioxidants, consumption of which is often associated with reduced risks of certain serious disorders. Dietary antioxidants include vitamin C, vitamin E,  $\beta$ -carotene, polyphenols and other non-nutrients bioactive substances. Microgreens contain

lutein, a lipid-soluble antioxidant pigment, which neutralizes the adverse effects of photochemical reactions. Polyphenolic compounds in microgreens are associated with reduced risk of several diseases. Chlorophylls, which are another major group of antioxidants in microgreens, have been reported to exhibit chemoprotective activity in carcinogenic conditions.

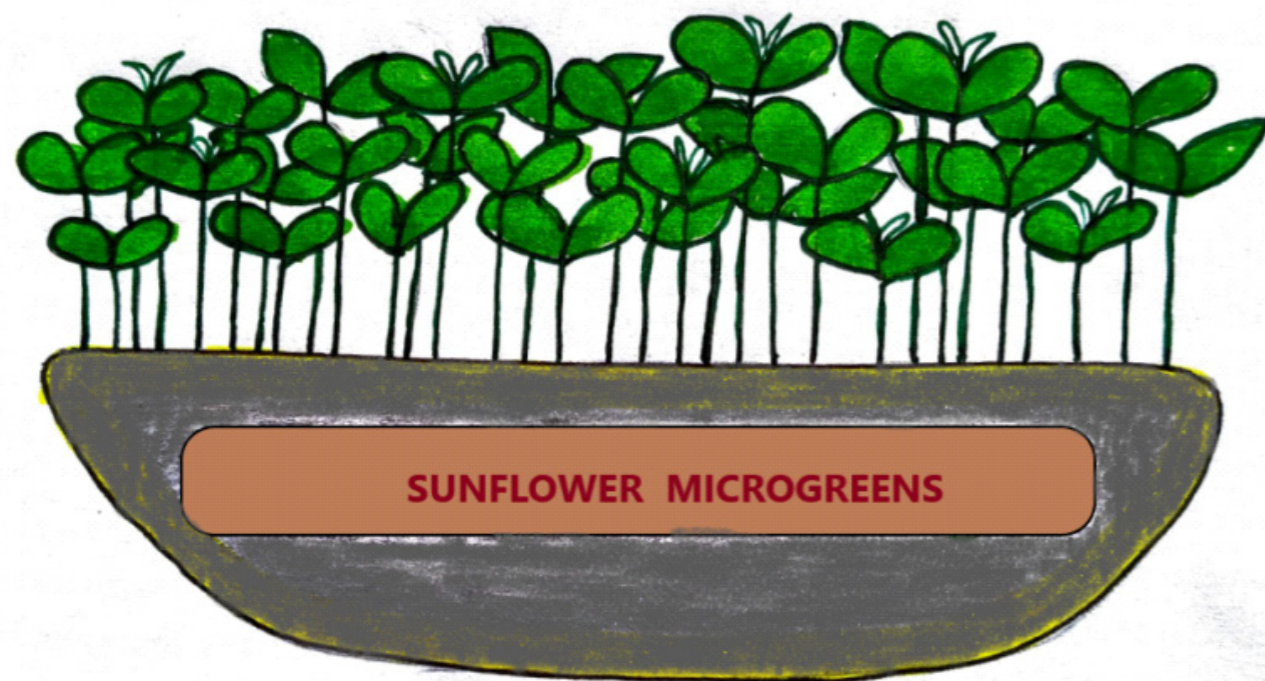
## BENEFITS OF GROWING MICROGREENS

The advantages of leafy- and micro-greens in human diet are gradually being understood worldwide, ensuring their demand in the market. Now a day, crop failure of vegetables grown outdoors has become a major problem for the farmers, thus, there is a great scope of starting a enterprise with very

low investment by growing microgreens inside the room successfully. The microgreens may be sold both in vegetable markets and nearby top restaurants once a week to get higher prices and rising production according to customer demand. Microgreens from seed to harvest take very little time, therefore, the farmer does not have to wait for a longer period to earn money for their needs.

## GROWING MICROGREENS: INDOORS VS. OUTDOORS

Microgreens can be grown on a wide range of temperature since wide range of plant species are used for the production of microgreens. Usually, 20 to 22°C temperature is most optimum for the growth of microgreens of all summer and winter species. However, the seeds of *Brassica* species can germinate at a bit cooler temperature. Time taken by the seedlings to reach the marketable stage increases with the decrease in temperature. Warmer conditions favour the quick growth of microgreens. The absolute first choice of a farmer for microgreens is to decide whether the outdoor or the indoor conditions are suitable for the production of superior quality microgreens, which can be made possible by creating a perfect and controlled environment. As per the experienced farmers, indoor conditions are far better for the production of superior quality microgreens since the temperature, humidity and light inside can be maintained as per the requirement of microgreens and the fluctuation in atmospheric conditions inside can easily be controlled. Therefore, a farmer can use any room in his home for the production of microgreens, which can be grown under low-light conditions since the seeds can use the stored energy in the form of starch and proteins for germination. However, the yield and quality of microgreens increase with the increase in light intensity. Outdoor conditions have their own prospects and constraints. The most important merit of growing microgreens outdoors is that it does not require any artificial light but environmental conditions outside the house may not be appropriate round the year for growing microgreens. Greenhouse can be a better option for the growing of microgreens, however, constructing a greenhouse is very expensive for the farmers under Indian situations. In late fall, winter and early spring when light is limited, supplemental light is needed. If sunlight is not available, artificial light may be used for the harvesting of best quality microgreens.



## HOW TO GROW MICROGREENS?

Microgreens can be grown successfully through a variety of production systems. Media like soil, tissue paper, hydroponics, etc. can be used for raising microgreens but a mixture of cocopeat, vermiculite and perlite can be used for growing microgreens in a ratio of 5:2:1, respectively, as this mixture releases nutrients very slowly, hence, the same medium can be reused several times for raising young greens. Neogreens can also be raised in large open packs or flats filled with peat or coconut coir-based substrates. The most important consideration for the sowing of seeds for the production of microgreens is the seeding rate per unit area since the seeding density affects the yield of microgreens. As the seeding rate increases, the weight of individual seedling decreases due to competition among the seedlings but there is an increase in total yield per unit area. Generally, the seeds of microgreens do not require much nutrients for germination though require only ideal environmental conditions (temperature and proper moisture for imbibition) for germination and further growth. However, providing mineral nutrients in solution form will increase the yield of microgreens. Treatment of seeds with any chemical is taboo in microgreens and using hybrid seeds may not be economical.

## SOWING TIME

For microgreens, the seeds can be sown round the year as per the consumer's need. Before reusing of previous media, the roots and other remnants of microgreens should completely be removed from the trays. Before filling in trays, the media should be exposed to sunlight for its disinfection. Any room or mini-greenhouse where optimum temperature, humidity and light intensity can be provided may be used for keeping the microgreens trays for better harvest.

## HARVESTING AND PACKAGING

Microgreens become ready for harvest 7-14 days after germination under tropical and somewhat longer (14-28 days) under temperate conditions, depending on kinds of crop and other environmental conditions. Microgreens when attain a height of 2.5 to 7.6 cm are cut just above the surface of media using a sharp knife. Microgreens have a short time span of usability, thus, require better strategies for storage and transport. Microgreens are tender and susceptible to bruising, therefore, biodegradable clamshell containers are used for the packaging of microgreens. When microgreens are packed in bags, ample air space is left in top of the bags to protect the fragile shoots. The consistency and quality of cut microgreens can be preserved by packing in modified atmospheric packaging and storing at low temperature. Microgreens of different species are stored at different temperature based on their susceptibility or tolerance to temperature.

## SUMMARY

Microgreens are new generation smart food, popularity of which is increasing day by day. These are tiny immature edible form of green leafy vegetables obtained from different kinds of vegetable, herb and plant and popularizing as new culinary ingredients, which are having a higher content of minerals, vitamins and many non-nutrients bioactive compounds and are more nutritious than their mature plant parts. They have an appealing appearance, soft texture and powerful flavour and supply of essential nutrients. Microgreens also have strong market acceptability due to their flavour and texture.