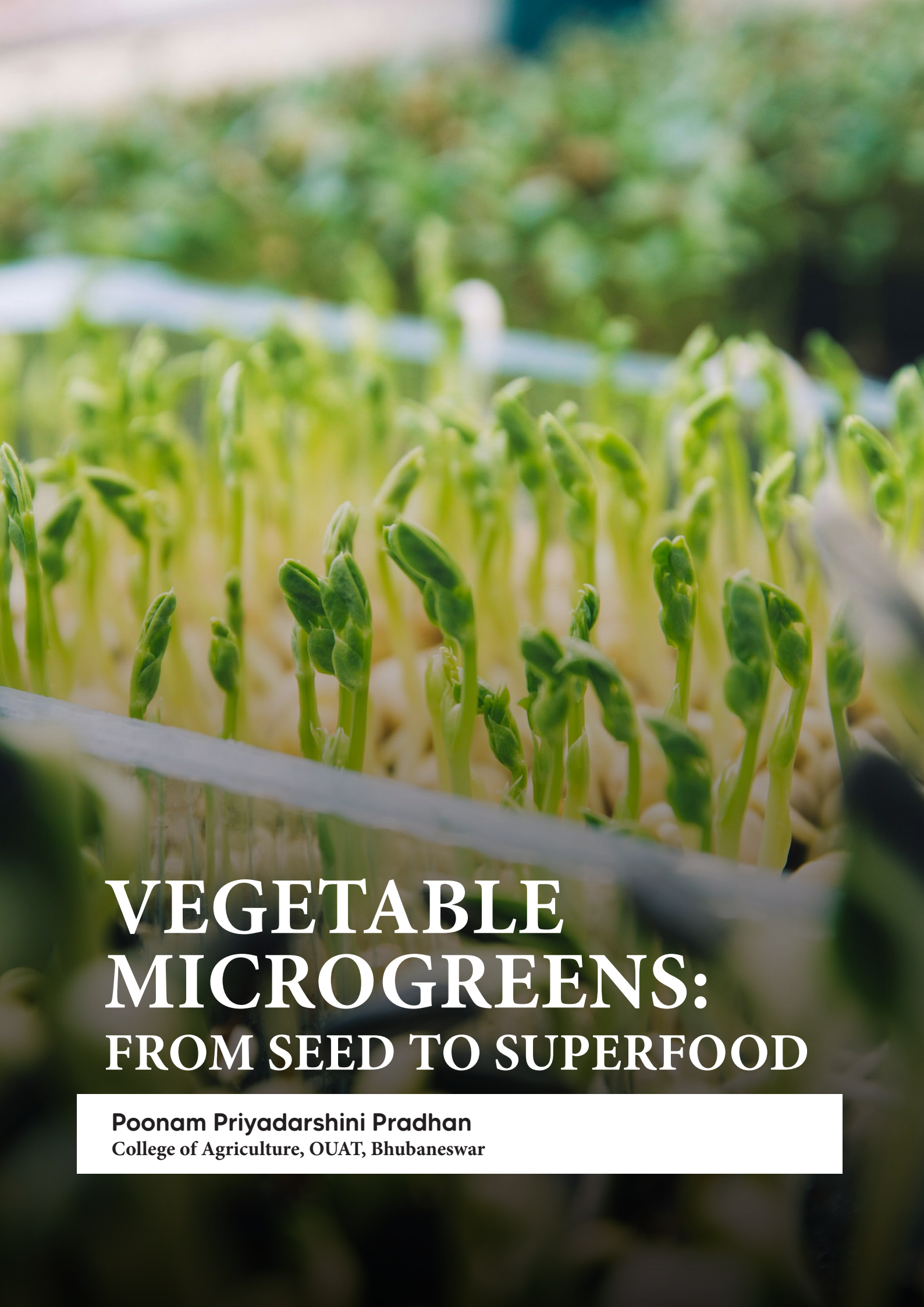

VEGETABLE MICROGREENS: FROM SEED TO SUPERFOOD

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INTRODUCTION

Microgreens commonly known as 'vegetable confetti' are soft juvenile greens, raised from seeds of grains, vegetables, herbs that have immature shoots and it consists of a central stalk, two mature cotyledon leaves, and a second pair of young true leaves. They are only a few centimetres tall, i.e., 2.5 to 7.5 cm tall and are usually harvested 7 to 21 days after germination.

There are 4 different stages of growth of a plant, viz.

i. Sprouts: Sprouts are the youngest and smallest. Their cotyledons are not opened or just opened, and they should be consumed within a week.
ii. Microgreens: Microgreens are slightly larger and older. They are 2-3 inches tall and should be consumed within 7-21 days.
iii. Babygreens: Babygreens are the oldest and largest, usually 3-5 inches tall. They should be consumed within 21-40 days.
iv. Mature greens: They are completely grown and their harvesting is done after complete maturity of the crop.

Fig. 1: Broccoli sprouts

Fig. 2: Pea microgreens

Fig. 3: Spinach babygreens

Fig. 4: Collard mature greens

POPULAR VEGETABLE MICROGREEN IN INDIA

Vegetable microgreens are those that are produced particularly from vegetable seeds. Most popular microgreens vegetables in India are mentioned from the following families: Brassicaceae (cauliflower, cabbage, watercress, radish and arugula), Asteraceae (lettuce, endive, chicory), Apiaceae (dill, carrot, fennel and celery), Alliaceae (garlic, onion and leek), Amaranthaceae (amaranth, quinoa, Swiss chard, beet and spinach) and Cucurbitaceae (melons, cucumber and squashes). However, tomato, brinjal and pepper are non-edible species because they have some anti-nutritional factors.

Some important vegetable-based microgreens are:

Argula	• Peppery, slightly buttery • Rich in vitamins A and C and minerals Ca, Fe and P
Beetroot	• Attractive reddish and purple leaves • Delicious, mild spinach-like flavour • Rich in vitamins A, B and K
Brussels sprout	• Flavours like cabbage or broccoli • Vitamins B, C and K, folic acid, fiber
Broccoli	• Highly nutritious • Rich in Vitamins A and C; minerals, like Ca and Fe, and protein • High Antioxidants & sulphur levels
Cress	• Traditional microgreen • Finely curled leaves and gives peppery flavour • Good source of vitamins A and C, and sulphur
Carrot	• Fine textured leaves • Rich in β-carotene and other phytonutrients like zeaxanthin • Prevents cancer Anti-ageing in nature
Fenugreek	• High in protein, vitamins A, E and B, and minerals • Stimulates appetite • Effective against anaemia and fatigue
Fennel	• Light leaves and liquorish flavour • High source of vitamins K, C and B • Reduces risk of heart diseases
Kale	• Mild cabbage-like flavour • Known to be powerhouse of vitamin C • Rich in antioxidants • Prevents macular degeneration; rich in vitamin A
Linseed	• Mildly spicy and very tender • Highly nutritious and rich in Omega-3 fatty acids
Mustard	• Stimulates blood circulation • Effective against fever and cold
Pea	• Sweet and tender • Source of vitamins A, C and K; minerals Ca, Fe, Mg, P and K; amino acids and protein
Red cabbage	• Red/purple coloured microgreens • Mild sweet cabbage flavour • Rich in vitamins A, B, C, E and K; minerals Ca and Mg, and chlorophyll
Red amaranth	• Sweet and tangy flavour • Magenta coloured leaves • Rich in vitamins A, C and K, and minerals, like Ca and Fe
Radish	• Spicy in taste • Rich in Ca, Fe, K, Zn, antioxidants and vitamins A, B, C, E and K Minerals like Ca and Mg are also present
Turnip	• Deep green in colour • Flavour is same as turnip, rich in vitamin C, protein, fibre, antioxidants, K and Fe

MICROGREENS MASTERY: FROM SEED TO HARVEST

Materials and media required:

- Shallow, flat plastic trays of size 10" × 10" or 10" × 20" and 1 to 2.5" depth with good drainage are used
- Media: Coco peat or coconut coir, vermiculite, perlite and rockwool for better drainage, water holding capacity and repeated use
- Sterile and loose soilless media to prevent soil-borne diseases and keep it free from infection
- pH of 5.5 to 6.5 is suitable (2-3 drops of lemon juice may be added to get this pH)

Sowing seeds

- The tray is filled with moist media about 2-3 cm deep
- Pre-soaking is done in most of the seeds
- The seeds are broadcasted or sprinkled on top of the media
- The seeds are then pressed lightly
- They are covered with moist towel/ vermiculite/cocopeat to conserve moisture

Management

- Watering by spraying or sprinkling daily
- Relative humidity of 50-60 % should be maintained
- Good air circulation should be there
- Requires 12-16 hours of light and 18-24°C temperature

Harvesting

- Appearance of first true leaves
- Cut from above the media surface
- Packing without roots

Fig. 5: Filling plastic tray with media

Fig. 6: Sowing seeds on top of the media

Fig. 7: Covering the seeds with cocopeat

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Fig. 8: Watering the media using a sprayer

Fig. 9: Harvesting the microgreens

ADVANTAGES OF THE MICRO MARVELS

Microgreens act as "concentrated" nutritional source. They are powerhouse of critical vitamins and minerals like K, P, Ca, Mg, Na, Fe, Zn etc. Majority of them contain antioxidants, vitamin C, E, K and B complex, and some amount of carotenoids, like β-carotene, lutein, zeaxanthin and violaxanthin. They have multiple health benefits: it can prevent different inflammatory diseases, control blood pressure, control blood sugar, prevent various cancers and also reduce risk of heart diseases. It improves gut health and skin health. It has little risk of food poisoning as microgreens do not need a lot of humidity to grow, or do not need soil like baby greens, so the incidence of soil-borne disease is less. Peat and disposable growth mats are suitable for cultivating them. They are called 'tiny pants' and easier to grow than traditional farming as sowing and harvesting cycle may last only 15 to 21 days on average.

DECODING THE HIGH NUTRITIONAL PROFILE OF MICROGREENS

In comparison to mature equivalents, a few days of photosynthesis typically provides 4 to 6 times more nutrients, including vitamins, minerals, ascorbic acid, beta-carotene, antioxidants and ascorbic acid. Germinating embryo possesses abundance of glucose which is used for the synthesis of various carotenoids and vitamin C. Enzyme activation decreases anti-nutritional substances, seed germination, improves the nutritional value of plants. Fibrous components attached to vitamin, minerals, and amino acids are broken down during germination. Increase in hexose-p pool in germinating embryo results the activation of various pathways that involves synthesis of different vitamins.

MICROGREENS: NAVIGATING NECESSITY

- Used for nutritional security as, in high altitude area where availability of food is a problem, these microgreens can serve as potential food item and feed troops in crucial period.
- Provides a lot of health benefits.
- Can be used as space food as heavy food items cannot be taken into the space but microgreens are light and easy to carry, and also provide optimum nutrition in required amount.
- Used for skin formulation, e.g., spinach paste gives a cooling effect to skin and some skin irritation; used as face packs also.

Fig. 10: Microgreen salad

- Used as dry microgreens, or used as smoothies, salads and baked products. Dried microgreen-based drinks can also be prepared.
- As diet is the major concern now-a-days and weight loss is the main solution to obesity and to remain fit, microgreens can be used. They can be tossed in salads, blended into a smoothie, used as topping in soup or pasta, and for better health option, mustard and amaranth dal can be made.

Fig. 11: Microgreen smoothie

- They are highly concentrated in bio-active compounds, pesticide residue-free and boost immunity.
- Used as functional food and can act as weapon to fight against malnutrition.
- Microgreens are excellent crops for urban gardening in constrained locations since they can be grown with minimal resources in almost any environment. Urban microgreen gardening provides home growers with the opportunity to make money from a little space in their houses with minimal upfront costs.