



Kale farming made efficient: Extension insights for growers

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Growing Seasons in Kashmir

Kale is a cool-season crop and can be grown in two main seasons in the Valley:

Spring-Summer Crop:

- Nursery Sowing: Mid-February to Mid-March (under protected cover if frost is expected)
- Transplanting: Late March to April
- Harvesting: May to July

Autumn-Winter Crop (Main Season):

- Nursery Sowing: August
- Transplanting: September
- Harvesting: October onwards

It can overwinter under snow or mild frost. The flavour becomes sweeter after exposure to frost.

Begin harvesting 45-60 days after transplanting by picking mature outer leaves regularly, allowing continuous production. This ensures a steady supply over an extended period. Harvesting should be done early in the morning to retain freshness and minimize wilting.



Suitable/ Diverse Varieties

Over the years, ICAR-CITH, Srinagar has been dedicated to the conservation and improvement of kale genetic resources in Kashmir. The institute has collected, maintained and characterized over 65 kale genotypes both at morphological and molecular level. This rich germplasm collection, sourced from across India and abroad, includes diverse landraces and improved lines, each with unique features catering to regional preferences. *Khanyari*, *Kawdari*, *GM Dari* and *Hanz Hak* are traditional Kashmiri varieties that have been selected over generations for their taste, tender leaves, and disease resistance, making them especially popular in local markets. Siberian kale, an introduced variety, stands out for its

superior frost tolerance and mild, tender leaves, making it suitable for harsher winters and favored in salads. Lacinato kale, also called 'Dinosaur kale' or 'Tuscan kale,' sourced from USA features dark green, blistered leaves and offers a distinctive earthy taste. Both Siberian and Lacinato are recognized for their high nutritional value and suitability for diverse culinary applications, from raw salads to cooked dishes. Pusa-Sag-64, a prominent variety bred by ICAR-IARI, New Delhi, recognized for its vigorous growth, attractive dark-green curly leaves, and high nutritional content. These diverse varieties give kale growers the flexibility to meet consumer demand year-round while supporting resilient, nutritious crop production.



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Introduction

Kale (*Brassica oleracea* L. var. *acephala*), a member of the family *Brassicaceae*, is one of the earliest cultivated brassicas and closely related to wild cabbage. Renowned for its exceptional nutritional profile, kale is particularly rich in vitamins, especially, vitamin C and pro-vitamin A—as well as minerals like calcium, phosphorus, potassium, magnesium, and iron. Studies highlight kale as 'superfood' with some of the highest concentrations of total antioxidants among leafy vegetables, making it a valuable addition to nutritious diets.

In India, kale is widely cultivated in the temperate regions on about 4,000 hectares with productivity of 22.59 tonnes per hectare, with Kashmir valley holding the distinction of being the primary area where it is grown on a large scale, both in home gardens and commercially around cities. In Jammu and Kashmir alone, it is grown on 2,460 hectares. The vegetable, popularly known as “haak” in Kashmir, is favored by all socio-economic groups. Interestingly, the Sanskrit term for edible greens, “shaak,” evolved into “saag” in many regions of India and “haak” in Kashmir. Locally known varieties such as *Hanz Haak*, *Kawdari*, *Khanyari* and *GM Dari*, are prized for their yield, quality, and disease resistance, suited to local consumer preferences. Kale supplements the food needs of the valley through summer and winter, making it a widely grown crop.

Kale in Kashmir demonstrates remarkable genetic diversity due to its highly cross-pollinated nature, resulting in considerable variability for key agronomic traits such as leaf yield and morphological characteristics. Recent molecular studies on Kashmiri kale have revealed the existence of distinct genetic clusters among indigenous and introduced varieties, underscoring the potential for future breeding programs targeting higher yields and enhanced resistance to biotic and abiotic stresses.

Climatic requirements of kale

Kale thrives in the cool climate of Kashmir, tolerating temperatures as low as -10°C to -15°C , but optimum growth occurs between 15°C to 21°C , and the crop is highly resistant to frost. Sowing is best done in July, followed by transplanting in August with harvesting commencing 45–60 days after transplanting allowing production through the cold season.

Sowing, Land Preparation, and transplanting

Sow seeds in a well-prepared nursery bed. Seeds germinate in 5-8 days. Kale prefers well-drained, loamy soil rich in organic matter. A soil pH between 5.5 and 6.5 is ideal. Plough the field to a fine tilth. Incorporate 15-20 tonnes of well-decomposed FYM or 7.5 to 10 tonnes of vermicompost per hectare before transplanting to boost fertility and moisture retention. Seedlings are ready for transplanting 4-5 weeks after sowing, when they have 4-5 true leaves. Transplant seedlings at a spacing of 45 cm between rows and 30 cm between plants. This allows for proper air circulation and growth.



Fertilization

As per recommendation (SKUAST-K), apply fertilizers at 60 kg N, 40 kg P_2O_5 , and 40 kg K_2O per hectare as basal dose at transplanting. Apply an additional 30-40 kg of Nitrogen per hectare, 3-4 weeks after transplanting, to boost leafy growth.

Irrigation

Kale requires consistent moisture for tender leaves. Regular watering is crucial, especially during dry spells. Drip irrigation is highly recommended to conserve water and keep foliage dry, reducing disease risk.



Weeding

Intercultural operations such as weeding should be done manually or by hoeing, especially within the first month after transplanting. Regular weeding ensures healthy crop growth by reducing competition for nutrients, water, and light.

