

Dalle Khursani: A unique local cultivar of chilli of Sikkim Himalayas

Dalle khursani (*Capsicum annum*) belongs to the family Solanaceae and is one of the important cash crops of Sikkim, well known for its distinct flavour and high pungency. It is cultivated in Sikkim and its neighbouring states Darjeeling and Kalimpong, West Bengal. It is used as a spice and is consumed almost daily by the people of the hills either as fresh chilli or in pickled form. Dalle Khursani contains capsaicin, phenolic compounds, carotenoids, vitamin A, C, E, and minerals. A huge diversity exists in Sikkim for chilli which has not been explored fully. There is a high probability that this chilli might have some genes/alleles that are resistant or tolerant to various biotic and abiotic stresses, or may possess nutraceutical and pharmaceutical compounds which can be utilized for various improvement programme of chilli.

DALLE Khursani (*Capsicum annum*) belongs to the family Solanaceae and is one of the important cash crops of Sikkim. Dalle Khursani literally means 'round chilli' because of its shape. It is well known for its distinct flavour and high pungency, and has been rated as one of the hottest chilli in the world with 100,000-350,000 Scoville Heat Unit (SHU). Recently, it has earned its GI tag in September, 2021 which has further increased its value in world market. It is cultivated in Sikkim, and Kalimpong and Darjeeling districts of West Bengal in India. Dalle khursani is available almost every day and throughout the year in the cuisines of Sikkimese people either as fresh green chilli during the peak season or as pickled product during off-season. It is used for making pickle, sauce, paste, powder and dry chilli. It is popularly eaten as chutney with tomato alongside momo. This chilli contains capsaicin which produces different pungency level as well as carotenoids and phenolic compound, and is being used as natural pigment and antioxidant agents. It is also rich in vitamin A (11,000 IU/100 g), vitamin E (0.7 mg/100 g), vitamin C (1000-1010 mg/100 g dry matter), niacin, magnesium, potassium, and has low sodium content.

Botany

It is perennial in nature. Plant is almost 100-130 cm in height. Leaves are simple, large, opposite, acuminate, entire, with wavy margins. Flowers are small; creamish yellow

coloured, appear in the axils of the leaves, solitary and sometimes in cluster. Fruit size varies from small to medium with round, elongate, almost round, triangular shapes. Fruits are green, become red when ripe, and contain many compressed yellowish-white seeds. Fruit bearing habit is upright and downward type. Anthesis is during morning hours. Chilli is self-pollinated crop but cross-pollination has also been reported. Chromosome number is $2n=48$ and is a tetraploid cultivar.

Climate and soil

It prefers warm and humid climate with temperature of 20-25°C for its optimum growth and flowering. It does not tolerate very high temperature and heavy rainfall as it causes flower drop and fruit bud drop. Sandy loam soil with neutral pH of 6-7 is ideal.

Varieties

Nagey, Sanu Dalle, ThuloDalle

Land preparation

The land is ploughed two to three times to make a fine tilth before transplanting. All the debris, stubble, stones and other unwanted materials are removed. The soil of Sikkim is acidic in nature therefore, addition of dolomite is recommended @ 2 t/ha at the time of field preparation to maintain its pH. Chilli should not be grown in the same field as in the previous season so as to minimize the disease incidence especially bacterial



Dalle Khursani



View of the fruiting plant



Field view

wilt which is soil borne disease and its incidence has increased in the last one-two years.

Sowing

The seeds are sown in nursery during March-April. For nursery, raised beds are prepared with 1 m width and length as per the convenience. The beds are incorporated with FYM @ 4-5 kg/m², vermicompost @ 1 kg/m² and neem cake @ 200 g/m². Soil borne disease such as damping-off is very common in seedlings of chilli in nursery, the beds should be treated with *Trichoderma viride* @ 20 g/m² area or drenching of soil with *Trichoderma viride* @ 10 g/L. A 500-600 g of seed is sufficient for one hectare area. Seeds are sown in lines with 2 cm depth and are covered with paddy straw or dried leaves for early germination.

Transplanting

Seedlings are ready for transplanting when they are 30-35 days old. To protect the seedlings from transplanting shock, they are hardened by withholding irrigation for few days before transplanting. The seedlings are treated with *Trichoderma viride* + *Pseudomonas fluorescens* @ 10% for 15 minutes to control soil borne diseases. The transplants are planted at a distance of 1 m × 1 m distance between plant-to-plant and row-to-row.

Organic nutrient management

In organic farming, it is recommended to use legume crops in crop rotation which not only fixes atmospheric nitrogen but also improves soil fertility. FYM @ 25-30 t/ha, neem cake @ 2 t/ha, vermicompost @ 2-2.5 t/ha is applied as basal dose during field preparation for chilli cultivation. Bio NPK and Multiplex can be applied as foliar spray 30-45 days after transplanting to improve its growth.

Mulching

It is an important intercultural practice being carried out for chilli cultivation in Sikkim. Due to heavy rainfall in the region, the emergence of weed is very fast and manual weeding become tedious. Also, there is a chance of soil erosion nearby to the root zone. For this, black plastic mulch with a thickness of 25 micron is used. A

raised bed with 1 m width is prepared and the mulch is laid on the bed. The seedlings are planted at the centre of the bed. Mulching helps to prevent weed growth, maintains optimum soil temperature, prevents soil erosion, and conserves moisture which is very crucial during later part of crop growth.

Staking is also given to the plants after the plants have reached 1 ft height with bamboo to prevent from lodging.

Irrigation

The number of irrigation depends upon the soil and climatic factors. Generally, irrigation is given at weekly interval. Heavy irrigation is not recommended as it increases the incidence of bacterial wilt and also causes flower and fruit drop.

Harvesting

The plant becomes ready for harvesting at 90-120 days after transplanting. Fruits are harvested in multiple pickings (5-8 times). The yield per plant varies from 500 g to 1.2 kg. Green fruits are harvested for fresh consumption while red ripe fruits are harvested for processing purpose.

Pests and diseases

Fruit fly: It is a major pest of dale khursani in all the chilli growing areas of Sikkim. The female fly lays egg under the epidermis of the fruit. The fruit infested with it develop small dimple where the flies have deposited eggs. The maggots after hatching from egg move to the core of the fruit to feed. They also feed on the walls of the fruit. The infested fruit rots and drops.

Management

- Installing Fruit fly trap @ 10-15 traps/ha during fruit set. The traps should be replaced after sometime.
- Collecting the infested fruit from the ground and destroying them.

Aphids: Both nymph and adult suck plant sap from tender shoots, stems and leaves. The affected plant parts are distorted, stunted and often curled under. They secrete honey dew which attracts ants and develops sooty mould in the upper parts of the leaves. It also transmits viral diseases.

Management

- Spraying plant with Neem based formulation @ 5 ml/L at weekly interval.
- Spraying of petroleum based oil spray @ 10 ml/L.

CONCLUSION

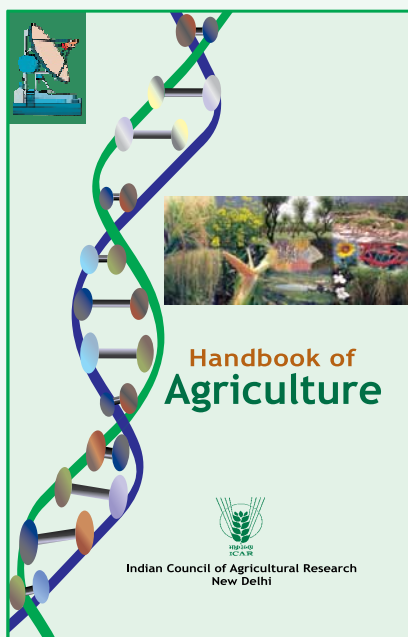
Dalle Khursani is a high value crop of Sikkim which gives good return to the farmers. Its scope of export to other states and countries has been increased due to the GI tag. However, systematic studies are required to carry out in this chilli as it might be the source of number of genes/alleles contributing to resistance against abiotic and biotic stresses, compounds that have pharmaceutical and nutraceutical value.

It has a great potential in future chilli breeding programme as till date its diversity has not been utilized properly and not included in any breeding programme. ICAR-RC for NEH Region, Sikkim Centre has been focussing to utilize the locally available cultivars for breeding programme and the Centre is providing training on cultivation aspects as well to the farmers and other stakeholders.

For further interaction, please write to:

Tshering Lhamu Bhutia (Scientist-Vegetable Science), ICAR-Research Complex for NEH Region, Sikkim Centre, Tadong, Gangtok, Sikkim 737 102. *Corresponding author email: tl.bhutia2021@gmail.com

Handbook of Agriculture



The Handbook of Agriculture is one of the most popular publication of the ICAR with a wider readership. The present edition presents science-led developments in Indian agriculture, the ongoing research efforts at the national level and with some ideas on the shape of future agriculture. While information in some chapters such as Soil and water, Land utilization, field and forage crops has been updated with latest developments, many new topics such as the Environment, agrobiodiversity, Resource conservation technologies, IPM, Pesticides residues, Seed production technologies, Energy in agriculture, informatics, Biotechnology, Intellectual Property Rights, Agricultural marketing and trading and Indigenous Technical Knowledge have been included in the present edition. For those who take intelligent interest in agriculture – and their number is increasing fast – the present edition would serve as a useful book.

TECHNICAL SPECIFICATIONS

Size	:	Royal Octavo (16 cm x 24 cm)
No. of pages	:	i-xii + 1618
Price	:	₹ 1500
Postage	:	₹ 100
ISBN No.	:	978-81-7164-096-6

For obtaining copies:

Business Manager

Directorate of Knowledge Management in Agriculture
Krishi Anusandhan Bhavan-I, Pusa, New Delhi 110 012
Tel: 011-25843657, Fax: 09-11-25841282; E-mail: bmicar@gmail.com