

Cultivation Protocol For

Bunium persicum



Family: Apiaceae (Umbelliferae)

Local/common names: Black cumin, Kalajira, Umbu, Siahzira

Status: Endangered (IUCN)

Distribution and habitat: The plant is common in southeastern Europe, Siberia and western Asia. It is a native of Baluchistan, Afghanistan, Kashmir and Himachal Pradesh. In Himachal Pradesh, the species is available in Chamba, Kinnaur, Lahaul and Spiti districts. It is mostly found between 2000-3500 m under domestication.

Environment for growth: *Bunium* requires well-drained acidic soil for optimum growth. Sandy loam soil that is rich in well-decomposed organic matter is preferred for cultivation. It can grow under semi-shade on gentle grassy slopes. Forest soil of low alpine pastureland is ideal for its growth. The species grows in the forests, grassy slopes and to some extent in the alpine pastures. High hill regions experiencing 1-5 m snow fall in winters and very low rains in summer are considered most congenial for germination, growth and development. Low rainfall during summer at flowering and seed setting stages contributes towards high yield, better flavour and quality of seeds.

Parts used: Fruits and roots are edible.

Market rate: In general the price varies between Rs. 450-500 per kg.

Agro-technology

- **Means of propagation:** Kalajira is propagated mainly through seeds, but its subsequent growth and production is maintained by tubers/bulbs, which are formed 10-15 cm deep in the soil by the germinating seedlings. It requires three-four years to produce viable seeds. From the same new seed crops are raised through seed. Plants raised through 7-8 years old tuber produced more branches, an average height of 50-60 cm with 40-50 cm spread.
- **Collection of seeds:** The seeds sown during October-November germinate after the melting of snow in March-April.
- **Seed Treatment and germination:** Chilling pre-treatment for 4-5 long months enhances the germination rate and is necessary for good germination. Seeds are small and therefore mixed with sand and then sown at 3-4 cm deep in soil in line.
- **Land Preparation:** The land is ploughed into a fine tilt after the crop stubbles or weeds are removed. Rocks are to be removed from the field and deep-rooted sedges have to be totally uprooted. The clods or hardened masses of soil are to be broken as, they can impede germination of the seeds. Soil compaction resulting from snowfall has to be removed by digging up of the soil. The land attains a fine tilth after 2-3 rounds of deep ploughing after which, well rotten farmyard manure is mixed with the soil at the rate of 3500 kg/ha or an equivalent of 280-300 kg/bigha. A sufficient gradient is provided to the land by ploughing and levelling of the soil for facilitating drainage. Levelling of the field has to be done and slope is to be maintained within the beds and between the beds to facilitate irrigation.
- **Nursery preparation:** For seed propagation seeds are better to be collected from healthy plants with robust vegetative growth. The seeds should be fully

mature at the time of collection. Bold seeds should be separated and selected for sowing. Seed rate is 1-1.5 kg per ha in the first sowing. If sown in November the germination occurs in April. Maximum 200 g seeds may also be required for gap filling in the subsequent year. The maintenance of 2 lakhs plants per ha is ideal. As the seeds are very small in size they are mixed with sand properly. Lines of furrows are prepared around 40-50 cm apart. The seeds mixed with soil should be properly placed within the furrows at around 1.5-2 inches deep. The seeds should be immediately covered with a thin layer of soil.

- **Transplantation:** *Bunium persicum* should be grown in full sun. Even in the partial shade its growth is hampered although it may adopt the later but yield becomes less. When large enough to handle, the seedlings are pricked out into individual pots and grown there in the greenhouse for at least their first winter. It is advisable to transplant them out into field only in late spring or early summer when there is no expectation of frosts. The plants grow about 20 -30 cm in the first year and 60-80 cm in the second year. Distance between the plants should be maintained 8-10 inches. Theoretically 10-15 cm between the rows and 15 cm between the plants is an optimum option. But distance between the individuals as well as between the rows should be 45-50 cm to achieve the maximum production.
- **Vegetative propagation:** The species can also be propagated through bulbs. A bulb of the age of one or two years produces maximum one or two plants while from a third year bulb 4-5 buds may be developed. Tubers also require long chilling period for better sprouting and initiation of floral primordia. 1-1.5 kg of seeds is required at first sowing and re-seeding in subsequent years requires 200 g/ha to maintain optimum plant population.
- **Water management:** The first irrigation in the form of sprinkling is given just after seed sowing. The water requirement of *Bunium persicum* is not very high. About 2-5 irrigations are sufficient for reaping a good harvest. The irrigation should preferably be given before weeding to moisten the soil and weeding becomes easier. Other optimal times for irrigation are at peak time of flowering and formation of fruits.
- **Weed and pest control:** Fields must remain weed free. Normally, 3-4 weeding operations are carried out at an interval of 20-25 days. In the first year hand weeding is preferred to offer better protection to the juvenile plants. In the second year as the plants attain good height and therefore thorough weeding. White grubs and upper ground foliage attack the tubers by hairy caterpillars, armyworms and semi-loopers. Mixture of BHC/HCH or Aldrin 5% dust at the rate of 25 kg/ha is enough to control the white grub. Methyl parathion spray once in fortnight has been found effective for the diseases like semi-loopers, armyworms and caterpillars. It is suggested not to use any sort of inorganic pesticides. Spraying of biopesticides *Beauveria bassiana*, a fungus, at the rate of 5 ml per litre is very effective if the plants are well grown. In juvenile plants less concentration may be applied.
- **Maturity and harvesting:** The crops raised through seeds take about 3 years time to bear fruits with viable seeds while the plants maintained through bulbs take less period for fruiting. Normally the crop matures in late July or August

depending on the climate and altitudes. Flowers bloom from mid-July to mid-August and ripen in August. Browning of seeds indicates maturation. That means the total harvesting period lasts for 10-15 days. Mature plants are harvested daily in the morning. The seeds are collected when the oldest fruits turn brown. Care is taken to avoid loss of seeds by shattering of the umbel.

- **Post harvesting techniques:** For better maturity and storage the fruit bearing harvested stalks are sun dried for 3-4 to 7 days depending upon the volume of the harvest and number of sunny days. The plants are spread out in loose bundles for drying. The seeds from the dried plants are separated with the help of beating sticks. The dried fruits are then threshed by hand or by threshing machines and are cleared by winnowing. The seeds are then stored in a paper bag or closed container and kept in a dark cool place. The dried seeds should be stored in airtight container. Further processing is done via steam distillation immediately after crushing. Distillation takes about 6-8 hours. The seed yield is on an average 0.5 ton/ha.