

Potential for Black turmeric cultivation in Mizoram

Black turmeric (*Curcuma caesia* Roxb.) is a well-known crop among the Mizo community due to its various medicinal uses by the locals. It is either hunt in the jungle or grown in a small kitchen garden without proper management for domestic uses. A large diversity of black turmeric also exists in the wild across Mizoram. The rhizome is used to cure several diseases. As a result of over-exploitation from their natural habitat, they are likely to become extinct in the near future. This crop is grown without following suitable agronomic procedures, which leads to poor production and productivity. So, considering the importance and values of the crop, scientific cultivation method for this crop needs to be standardized to meet the demands of this crop. This crop also has the potential to be traded commercially, thus, it offers financial security and livelihood improvement among the local people.

BLACK turmeric (*Curcuma caesia* Roxb.) belonging to the family Zingiberaceae; is a perennial, underutilized, medicinal herb having diploid chromosome ($2n=42$) and is endangered to South-East Asia (Fig. 1). This plant grows in North-East, Central and some parts of South India. It has high economical value due to several medicinal benefits of its rhizome. It grows well in moist deciduous forest areas. It is supposed to be high in antioxidants. Its rhizome is claimed to cure several diseases like



Fig. 1. Black turmeric plants and its parts

asthma, leprosy, epilepsy, fever, bronchitis, stomach problems, piles, cancer, wounds, toothache, fertility, impotency and vomiting, etc. Owing to its high therapeutic value, it has been exploited indiscriminately from its natural habitat, limited area of cultivation and is a victim of biopiracy resulting its grouping into endangered species. It has a bluish-black coloured rhizome with a bitter taste and pungent smell. It is popularly called as Kali Haldi (Hindi), Ailaidum (Mizo), Yaimu (Manipuri), Kalahaladhi (Assamese), Kala manjal (Malayalam), Nalla Pasupu (Telugu) and also known as black zedoary.

Botanical description

The black turmeric plant is generally an erect, rhizomatous herb 0.6 to 1.6 m in height (Fig. 2a). Its leaves are generally present in a group of 10-25 and may vary with genotypes having 30-70 cm long and 10-18 cm broad lanceolate or oblong, glabrous, with a deep ferruginous purple cloud down the middle, that penetrates to the lower surface (Fig. 2b). The upper side of the leaves is rough and velvety. Flower petals may be deep pink or red in colour with sessile inflorescence. Its rhizomes are large ovoid tuberous in shape. The rhizomes possess adventitious roots, scarce of roots and warts are collateral (Fig. 2c). The inner part of the rhizome is bluish-black in colour (Fig. 2d) and emits a characteristic sweet smell, due to the presence of essential oil. It has a bitter and hot taste.

Traditional values

Crushed rhizome paste is applied to cut or injury to control bleeding and quick healing. The rhizome of black

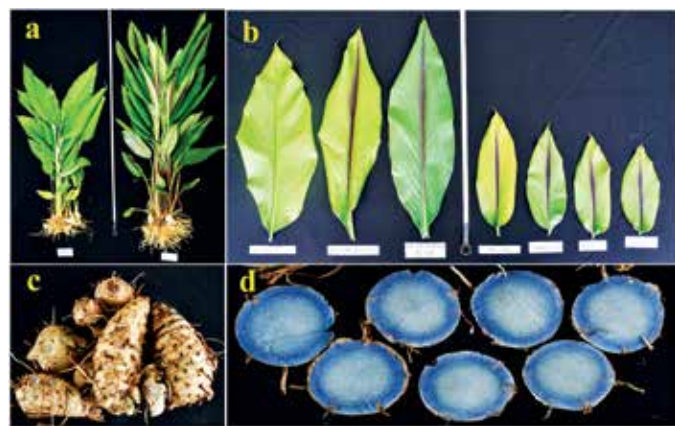


Fig. 2. Morphological description of black turmeric (a) Plant (b) leaves (c) mature rhizome (d) colour of rhizome

turmeric can be consumed during inflammation of tonsils. Its roots are grounded into powder and used with water to treat gastric disorder. Mizo people eat matured raw rhizome to get relief from stomach disorder. The Khampti tribes of Arunachal Pradesh apply fresh rhizome paste on snake and scorpion bites. Ground form of fresh rhizome is used in skin ailments. The Chothe tribe of Manipur use its rhizome in pox, wound and tumours. The Adi tribes of Arunachal Pradesh use a decoction of fresh rhizome as anti-diarrhoeal agent.

Agronomic practices

Black turmeric is propagated by underground rhizome. Rhizome of 20-30 g with two to three active buds is suitable for planting and requires 1.5-2 t rhizomes/ha. It starts emergence from 12-15 days after planting of rhizome (Fig. 3a-b). For proper growth and development, a well-pulverised soil has to be thoroughly mixed with well-decomposed FYM. Raised beds with 25-30 cm height, 2.5-3.0 m width and of convenient length are used for sowing or based on terrace width with a good drainage facility. The crop spacing should be maintained to 45-60 cm row to row and 25-30 cm plant to plant, tubers should be planted in the ground at a depth of 7 cm (Fig. 3c-d).



Fig. 3. Different stages of crop cultivation (a) field preparation, (b) germination, (c) crop at seedling stage, (d) active vegetative stage

Climate

Curcuma caesia usually grows in moist deciduous regions. The best season for its planting is monsoon or summer. In Mizoram, it can be cultivated from April to May months. It requires warm and humid climate to grow with partial sunshine. It can grow effectively at 10 to 45°C temperature.

Soil

Well drained sandy or clay loam soil, rich in organic matter and pH 4.5-6.5 is most suitable for its cultivation. It is a partial shade-loving species; however, it grows well in open sun under cultivated conditions. However, water-logging condition is detrimental to the crop.

Cultivars/varieties

No recommended variety is available for Mizoram, India. However, among the local cultivars, accession no. IC-0644173 (JKS/BL/IS/229) and IC-0644174 (JKS/BL/IS/2210) give better rhizome yield (Fig. 4).



Fig. 4. Rhizome of black turmeric having accession no. (a) IC-0644173, (b) IC-0644174

Field preparation

The field should be well drained and well tilled. Friable soils are best suited for its cultivation. The suitable season for black turmeric cultivation in Mizoram is April to May (Fig. 5).

Seed treatment

In order to improve seed germination and vigour, and to min seed and soil-borne diseases, seed rhizomes should be dipped in 2% solution of carbendazim for about 20 min. or 0.3% copper oxychloride for 30 min. The seed treatments with bioagents, use *P. fluorescens* 10 g/kg of rhizome and *T. viride* at 4 g/kg of rhizome.

Intercultural operations

In Mizoram, black turmeric is generally cultivated as a rainfed crop. However, in case of delayed rainfall at the flowering and tuber formation stage, supplement irrigation may be given. Weeding is an important operation for minimizing crop-weed competition. For better growth of the crop, generally 2-3 hand weeding are recommended, starting from 45 days after sowing.



Fig. 5. Field view of black turmeric crop

Harvesting

The crop matures in about eight to nine months.

Harvesting can be done from the second fortnight of December to mid-January. In order to avoid rhizome injury, soil should be moistened before digging the rhizomes. After harvesting, soiled rhizomes should be properly washed with clean water so that soil and other debris will wash out. Thereafter, sun drying and grading can be done. Under good agronomic management, black turmeric can yield 20-25 t/ha of fresh rhizomes having a dry matter recovery of 10-15%.

SUMMARY

Black turmeric is the native of north-east India and possesses a suitable climate for its cultivation. It has many medicinal values and remains as integrated parts of food habits of Mizo people for its uses in different medicinal purposes. However, cultivation of black turmeric in

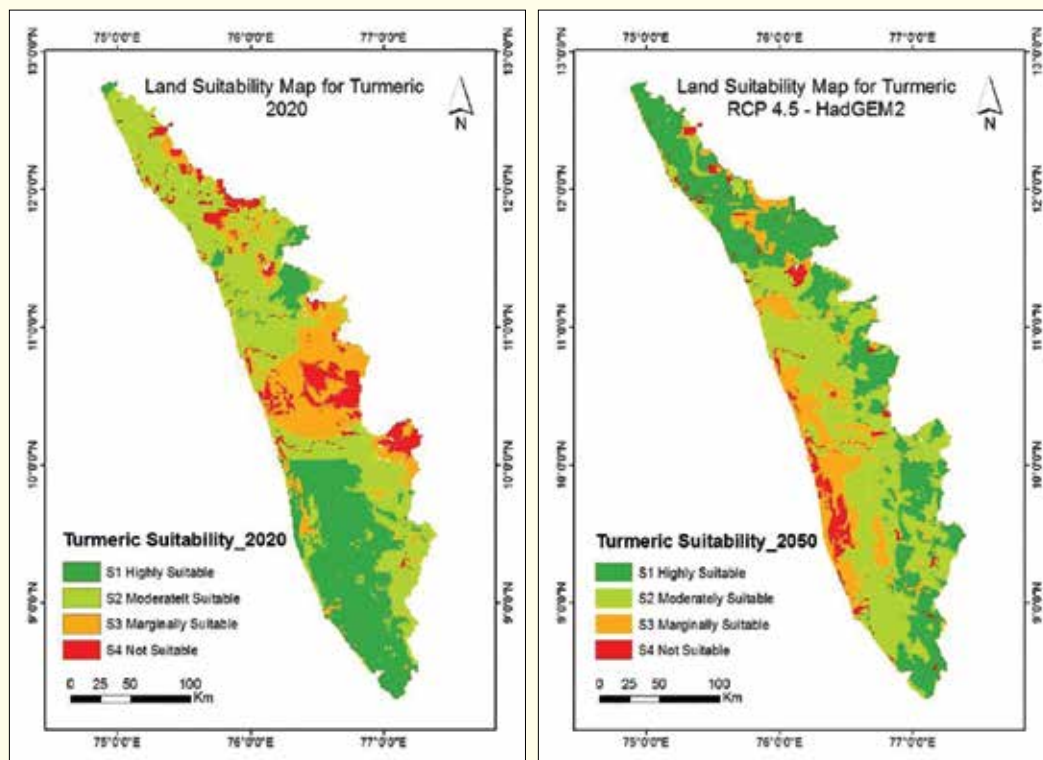
Mizoram is sporadic and confined mostly to kitchen garden. Mizoram is blessed with rich black turmeric biodiversity. Thus, exploration, collection and conservation of germplasm, and further selection of best performing genotypes are important for improving yield and quality. More research is required to tap the potentials of this crop and identify promising germplasm with scientific knowledge and breeding techniques to escalate the productivity and potential of its cultivation to a large scale.

For further interaction, please write to:

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Land-suitability analysis for turmeric in Kerala under projected climate

Climate change is altering the land suitability for crops depending on the influence of temperature and rainfall on crop growth and productivity. Current suitability and land suitability for turmeric cultivation in Kerala in 2050 was analyzed using HadGEM2 Model based on the Representative Concentration Pathway (RCP)-4.5 climate projection scenario during 2050s. Climatic parameters considered were rainfall, maximum temperature, and minimum temperature. For each parameter, four classes (highly suitable, moderately suitable, marginally suitable and not suitable) were designated and weighted overlay analysis was conducted. Land-suitability analysis for turmeric in Kerala revealed that southern Kerala is highly suitable for turmeric cultivation while northern Kerala is moderately suitable. Since the conditions are more favourable for turmeric cultivation in southern districts, more area can be brought under cultivation in these districts to enhance turmeric production. Under RCP4.5, highly suitable area is expected to increase from the current 28% to 33% during 2050s and not suitable area is expected to decrease from the current 11% to 7% during 2050s, which is a positive sign. As highly suitable area is expected to increase by about 5% by 2050, turmeric production can be enhanced if these highly suitable areas are utilized for turmeric cultivation.



Land suitability maps of turmeric in Kerala for 2020 and 2050

Source: ICAR Annual Report 2022-23