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Turmeric Cultivation: 'The Golden Spice' Strengthens the Hand That Feeds the World

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Abstract

Turmeric is one of most important ancient spices grown in India which play an important role in national economy. The aim of turmeric cultivation is due to its wide medicinal uses. Turmeric contains curcumin, essential oils, etc. India is a hub of genotypes and cultivars because of this, its demand is increasing in both pharmaceutical and food industries, since the knowledge of production practices and processing is essential for quantitative and qualitative yields. By the use of good agricultural practices (GAP) farmers can make quite good profit by cultivating this crop.

Keywords: Curcumin, Curing, Oleoresin, Post-harvest management.

Introduction

A '*Zingiberaceae'* family' member - *Curcuma longa L.*, a triploid species (2n =3x = 63) commonly known as Turmeric is a well-known indigenous spice crop along with its numerous medicative properties. It is also known as the Golden Spice, Indian Saffron, Indian Solid Gold, Haldi, etc. Turmeric is native to Southeast Asia and has been used for 4,000 years to treat a variety of ailments in Indian Vedic culture. Turmeric enjoys s unique distinction among spices due to its various medicinal properties and versatility. The active constituents of turmeric are the presence of specific pigments known as curcuminoids contained in a sort of Oleoresin among which 'curcumin' is the most important one due to its wide spectrum of pharmacological properties, mainly antioxidant, anti-cancer, thermogenic, emollient, anodyne, anti-inflammatory, vulnerary, depurative, antiseptic, appetizer, carminative, expectorant, Stomachic, stimulant, anti-ageing, etc.

Area and Production

Turmeric is grown all over the world among which India leads in both production and consumption in the world. In the year 2022-23 an area of 3.25 lakhs ha was under turmeric cultivation in India with a production of 11.69 lakhs tonnes (over 75% of global turmeric

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production). More than 30 varieties of Turmeric are grown in India over 20 states in the country. Largest turmeric-producing states are Maharashtra, Telengana, Karnataka, and Tamil Nadu. India has more than 62% share of world trade in turmeric and also India is the largest exporter of turmeric in the world.

Major state wise area and production of Turmeric		
States	**2022-23(*)**	
	Area (ha)	**Production(tonnes)**
Maharashtra	88378	322052
Telengana	29898	159868
Karnataka	18982	130074
Tamil nadu	24746	136370
Madhya pradesh	22327	82352
Andhra pradesh	33416	80199
Orissa	31223	69065
West bengal	18772	50938
Mizoram	7918	29823
Assam	16958	23394
Gujarat	5177	20210
Total including others	**325611**	**1169864**

Source: Spices board. (*): Third adv. Estimate.

Improved varieties

- **IISR Prathibha:** The variety is released by ICAR – IISR in the year 1996. Developed by Pedigree method (Open-pollinated progeny selection). It can be adaptable across all over India. The crop matures in 225 days with an average yield of 39.12 tonnes of fresh rhizomes/ha. Curcumin content is prominently higher (6.52%), Oleoresin (16.2%), and Essential oil (6.2%) making it suitable for industrial, culinary and medicinal purposes.
- **IISR Pragati:** A high-yielding, dwarf, short-duration turmeric Variety released by ICAR – IISR. Developed by the clonal selection method. It can be grown in Kerala, Tamil Nadu, Andhra Pradesh, Telangana, Karnataka and Chhattisgarh states and is best suited in the region where serious irrigation problems are there. Crops mature in 180 days with an average yield of 38 t/ha (fresh rhizomes) and it can be increased up to 52

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t/ha under favourable conditions. Curcumin percentage is (5.02%). Variety is moderately resistant to root-knot nematode infestation.

- **Rajendra Sonia:** Dwarf variety released by DR. Rajendra Prasad Central Agricultural University, Samastipur, Bihar, from a selection of local germplasm. The crop matures in 200-210 days, with an average yield of 40-45 tonnes of fresh rhizome/ha. Curcumin level is high (8.4 %). Crops are resistant against leaf blotch and leaf spot disease.
- **IISR Alleppey Supreme:** The variety developed by selection from Alleppey finger turmeric. The crop matures in 210 days with an average yield of 35.4 tonnes of fresh rhizomes/ha. Curcumin content is (5.55%).

IISR Pragati

IISR Alleppey supreme

Rajendra Sonia

IISR Prathibha

Agronomic Practices

- **Soil and climate suitability:** Turmeric is grown in all types of soil but, it thrives well in well-drained sandy loam to loamy soil having enough humus content. It can be grown in the soil having pH range of 4.3-7.5. Turmeric is a crop of tropical and subtropical regions and can be grown from sea level to 1500 m above sea level. It requires a hot and moist climate. Panigrahi *et al.*, (1987) recorded the air temperature of 30-35°C, 25-30°C, 20-25°C, and 18-20°C during germination, tillering, rhizomes initiation and

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bulking, respectively, to be optimum. It is recommended for cultivation in irrigated areas.

- **Land preparation:** To get a fine tilth 2 or 3 ploughing followed by planking is necessary. In the case of an irrigated crop system ridges and furrows are made with the required height and the field should be free from Stubble and weeds.
- **Seed rate:** When mother rhizomes was used, the seed rate was 1800 kg/ha, whereas, in the case of finger rhizomes, it was 1200 kg/ha, while the general seed rate varies from 1000 to 1200 kg/ha (Rao, 1957).
- **Seed treatment:** Rhizomes are treated with Mancozeb and Bavistin (1.5 and 2 g/lit) by dipping for 15-20 minutes which provide prevention against fungal diseases and rhizomes fly during early period of growth.
- **Sowing time:** For getting higher yield the suitable sowing time for this crop is pre-monsoon i.e., during June and July.
- **Method of sowing:** For getting a higher yield ridge planting is recommended. For flatbed method planting, the optimum spacing is 25cm ×25cm, while for the ridge and furrow method, it is 45-60 cm between rows and 25cm between plants (Aiyadurai, 1966). Keep the soil moist until the sprouting of rhizomes.
- **Manures and fertilizer:** Turmeric requires a sufficient amount of organic and inorganic nutrient supply for high yield. Apply FYM (farmyard manure) @ 30-40 tonne/ha and mix it by ploughing. The optimum rate of NPK in Calicut, Kerala state is 60:50:120 (Sadanandan and Hamza, 1996). The optimum NPK rate for Allahabad, U.P., is 75:60:150 (Thomas *et al.*, 2002). These are applied in the split doses; the dose of potassium is high because it promotes root growth.
- **Biofertilizers:** Integrated application of coir compost @ 2.5 t/ha combined with FYM, biofertilizers (*Azospirillum*) and half the quantity of recommended NPK fertilizers significantly increased yield and quality (Srinivasan *et al.*, 2000).
- **Mulching:** Covering the soil either by organic (paddy straw) or inorganic (polythene sheet) mulches helps in the reduction of weeds. Hussain *et al.*, (1969) found mulch to enhance germination rate and lead to increase the rhizomes yield in Punjab state.
- **Irrigation:** Irrigation is provided with an interval of 7-10 days depending upon soil type and conditions. A total of 20-25 irrigation is provided during the whole crop duration.

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Intercultural operations

- **Hilling:** 'Hilling' or earthing up is one of the important cultural operations helps to form enlarge finger rhizomes. Usually earthing up is done after 45-60 days after planting (DAP), 90-105 DAP and 120-135 DAP. Flat bed, followed by earthing up, was found to be the best practice to maximise yield (Ajai *et al.*, 2002).
- **Weed management:** To keep crop weeds free 1 or 2 hoeing may be given. Weeding can be done 60, 90, and 120 days after plantation depending upon weeds intensity. Mohanty *et al.,* (1991) reported that mulching reduces the weed growth in turmeric field. Ajai *et al.* (2002) observed that Pendimethalin and Oxyfluorfen, followed by manual weeding, resulted in 45% and 35% more rhizomes yield, compare to unweeded control treatments.
- **Harvesting:** Turmeric crop maturity can be seen as yellowing of leaves and drying up of the plants completely. To obtain maximum yield, the turmeric crop should be harvested in about 8-9 months **(Govind, 1987)**. Normally, the harvest takes place between the month of January and March in India. The land is lightly ploughed and the rhizomes are hand-picked.

Post-harvest management

- The harvested turmeric rhizomes before entering into the market it converted into a stable commodity through several post-harvest processing operations like washing, boiling, drying and polishing. Boiling should be taken up within 3-4 days after harvest.
- **Washing:** The freshly harvested rhizomes will be covered by soil particles and soil microbes for removing this wash immediately after harvesting.
- **Boiling and Drying/Curing:** Curing is the process that involves cooking fresh turmeric rhizomes in boiling water for approximately about 60 minutes and then sun drying of rhizomes. Turmeric rhizomes cured by traditional water boiling for 40, 60, and 90 min, took 11 days for complete drying. Turmeric rhizomes cured in a steam boiler for 30 min. took 24 days for complete drying, 18 days when for 45 min and 12 days for 60 min of initial steaming (Jayashree *et al.*, 2016).
- **Polishing:** As dried rhizomes' outer surface looks very dull, rough and scales on it, presenting a poor appearance this can be improved by polishing. This can be done by manual or mechanical rubbing.

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- **Colouring:** It is done for marketing so that it can look attractive. Turmeric powder is used for this purpose it can be done by two methods one is dry colouring and other is wet colouring method.

Grading

1. **Fingers:** These are the lateral branches or "daughter" rhizomes, which are separated from central rhizomes. The size ranges from 2.5 to 7.5 cm in length and about 1 cm in thickness.
2. **Bulbs:** These are central "mother" rhizomes that are ovate shorter in length and larger in thickness.
3. **Splits:** These are the bulbs that have been split into halves or quarters to facilitate curing and drying.

Summary

` It is a wonder that the properties of turmeric mainly the magical yellow pigment curcumin have a wide spectrum of medicinal properties. It has been use in Ayurveda medicine since ancient times, with various biological applications. The percentage of curcumin is very important in both points of view i.e., use as a medicine and spice. The whole article is based on spreading the idea of turmeric cultivation in rural areas to double the farmer's income and bringing prosperity to rural people.

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