

## CULTIVATION PRACTICES AND PRODUCTION TECHNOLOGY OF TURMERIC

Alka sai<sup>1</sup>, Ravinsh Kumar Maurya<sup>2</sup> and Rajmani Singh

<sup>1</sup>Ph.D scholar, Department of Vegetable Science Indira Gandhi Krishi Vishwavidyalaya,  
Raipur (C.G.), India - 492006

<sup>2</sup>Ph.D scholar, Department of Horticulture, Institute of Agricultural sciences Banaras Hindu  
University, Varanasi, (U.P.), India - 221005

Ph.D scholar, Department of Horticulture, Babasaheb Bhimrao Ambedhkar University (A  
central University), Raebareli Road, Lucknow (U.P.), India - 226025

### Introduction :

Turmeric (*Curcuma longa* L) (family Zingiberaceae), is an important commercial spice crop in India. It is the ancient and sacred spice crop of India and known as 'Indian saffron'. It is also known as "spice of life" as well as "golden spice" (Sahoo, 2017). India is the leading producer and exporter in the world. It is used in the form of flavouring, condiment and colouring agent and as a main ingredient in Indian culinary. It has anti viral and anti cancer properties and mainly used in the cosmetic and drug industry. It has great significance in religious and ceremonial occasions. The increasing demand for natural products as food additives makes turmeric as ideal produce as a food colourant (Borate *et al.*, 2017). Turmeric is the dried underground rhizome of *Curcuma longa* L., a perennial herbaceous herb. Origin of turmeric is South East Asia particularly India. Turmeric is mainly produced in West Bengal, Odisha, Gujrat, Assam, Maharashtra and Karnataka. It is ready for harvesting in about 7 to 9 months after planting.

### Climate and soil:

Turmeric thrives well in warm and humid climate. Turmeric can be grown in tropical conditions, a temperature between 20-30°C with a rainfall of 1500 mm or more per annum or under irrigated conditions. It can be grown on a wide range of soil from light black loam, red soils to clayey loams, rich loamy soils having natural drainage and irrigation facilities are the best. Turmeric cannot stand alkalinity or water stagnation. Pigeon pea and Castor are planted on irrigation channel and on borders to provide shade.

### Land preparation :

The land is ploughed 5-6 times and ridges and furrow are formed at 50 cm apart. Rhizomes are dibbled at a spacing of 20 cm on one side of ridge at about 40 cm depth. The optimum spacing in furrows and ridges is about 45-60 cm between the rows and 25 cm between the plants.

### Material and planting :

Mother – rhizomes (bold and round) and fingers (thin and finger like) are most commonly used as planting material. Mother rhizomes are best for propagation. 2500 kg of rhizomes are required to plant one hectare. The mother rhizomes are planted as such or split into two, each having at least one bud. Fingers are cut into 4 - 5 cm pieces. The rhizomes are treated with chemicals (300 gm of wet cerasan or 625 gm of agallol in 300 litres of water for 30 minutes. Washed and dried in shade and again treated with 0.05% solution of phosalone or

nuvacron. Small pits are made with a hand hoe in the beds in rows with a spacing of 25x 30 cm and covered with soil or dry powdered cattle manure.

**Varieties :**

A wide range of cultivars are available in the country and are known mostly by the name of locality where they are cultivated. Some of the popular cultivars are Alleppey, Amalapuram Erode local ,Duggirala, Moovattupuzha Tekkurpet, Sugandham, Salem, and Lakdong. Some of the improved varieties are Suvarna, Suguna, Sudarshana, Prabha, Pratibha, Kedaram, Allepy supreme, Roma, Suroma, Ranga, Rashmi, Co1, Megha Turmeric 1(Anon., 2015)

**Manuring :**

Well rotten FYM @10 t/ha is incorporated as basal dressing. Beds are earthed up each time after top dressing. Recommended dose of NPK is 125:37:37kg per ha. Full dose of Phosphorus (P) and Potash (K<sub>2</sub>O) is given as basal dose at the time planting. About 125 kg Nitrogen (N) is required. In which 25kg as basal dose, repeat it four times each 25 kg at 30, 60, 90 and 120 days after planting.

**Intercultural Operations:**

**Mulching and weeding**

The crop is to be mulched after planting with banana pseudostem green leaves or sugarcane trash at the rate of 12-15 tonnes per hectare. It may be repeated for second time after 50 days with the same quantity of green leaves after weeding and application of fertilizers. Weeding may be done at 60,120and 150 days after planting depending upon weed intensity.

**Irrigation**

Turmeric crops require 15-20 irrigations in heavy soils and 35-40 in light soils. Growth and development is affected at moisture stress condition during the rhizome bulking stage.

**Plant protection:**

**Diseases**

**Leaf blotch**

Causal organism is *Taphrina maculans* and small, oval, rectangular or irregular brown spots appeared on either side of the leaves which later become dirty yellow or dark brown and leaves turn yellow. In severe cases plants have scorched appearance and the rhizome yield is reduced.

**Management :**

- Spraying mancozeb 0.2%.

**Leaf spot**

Causal organism is *Colletotrichum capsici*. Appearance of brown spots of various sizes on the upper surface of the leaves. White or grey spots of irregular shape appeared in the centre. Spots coalesce and form an irregular patch covering almost the whole leaf. The affected leaves dry up. The rhizomes do not develop well.

**Management:**

- Treat with carbendazim (0.5 kg/ha) or mancozeb (0.2 %) or copper oxychloride (0.2%).

**Leaf blight**

Causal organism of leaf blight is *Rhizoctonia solani*. Necrotic patches appeared with papery white centre of different sizes on the lamina which spread on the whole surface leaving a blighted appearance. The disease is more prevalently occurred during post monsoon season.

**Management:**

- Treatment with Bavistin 0.2% or Bordeaux mixture 1% with the initiation of infection.

**Rhizome rot**

The disease is caused by *Pythium aphanidermatum*. The lower leaves of the infected pseudostem show yellowing, collar region of the pseudo stem becomes soft and water soaked, resulting in collapse of the plant and decay of rhizomes.

**Management:**

- At the time of sowing, rhizome is treated with mancozeb 0.3% for 30 minutes before storage.
- Drenching of beds with COC 0.2% or Metalaxyl -mancozeb 0.125%.

**Insect pests**

**Shoot borer**

Major pest of turmeric is shoot borer (*Conogethes punctiferalis*). The larvae bore hole into pseudo stems and feed on internal tissues. The characteristic symptom of pest infestation is the presence of a bore-hole on the pseudo stem through which frass is extruded and the withered central shoot. Larvae are light brown in colour with sparse hairs.

**Management**

- Spray malathion (0.1%) or lamda-cyhalothrin (0.0125%) during july to October at 21 days intervals.
- Spraying should be done when the first symptom of pest attack is seen on the inner most leaf.

**Rhizome scale**

The rhizome scale (*Aspidiella hartii*) infests rhizomes in the field and in storage. Scales are circular (1mm diameter) and light brown to grey and appear as encrustations on the rhizomes. Insect suck plant sap and when the rhizomes are severely infested, they become shrivelled and desiccated affecting its germination.

**Management**

- Timely harvesting of rhizomes seed material with quinalphos (0.075%), before storage and also prior to sowing in case the infestation persists.
- Rhizomes are stored in sawdust along with dried leaves of *Strychnos nuxvomica*

**Harvesting :**

Harvesting should be done within 7 to 9 month after sowing depending upon the variety. The aromatic types mature in about 7 months, the intermediate types in about 8 months and the late types in about 9 months. Land is ploughed and the rhizomes are collected by hand picking or the clumps are carefully lifted with a spade. Extraneous matter and mud are cleaned from harvested rhizomes. Yield is about 8 -10 tonnes per acre of green turmeric. Mother rhizomes are kept as seed material for next growing season. Fingers are separated from mother rhizomes. For obtaining dry turmeric, green ginger is cured.

### **Curing:**

Fresh turmeric is cured before marketing. Curing involves boiling of rhizomes in fresh water and drying it in the sun. For processing no chemical is used. The cleaned rhizomes are boiled in earthen vessel or copper or galvanized iron with water just enough to soak them. Boiling lasts for 40-50 minutes till the fingers/mother rhizomes become soft. The cooked turmeric is taken out of the pan by lifting the troughs and removing the water into the pan. The same hot water in the pan can be used for boiling the next lot of raw turmeric which is already filled in the troughs. Alternatively, rhizomes may also be cooked using baskets with perforated bottom and sides. Mother rhizomes and the fingers cured separately. Curing of turmeric is to be done within 2-3 days after harvest. The cooked fingers/mother rhizomes are sun dried. 5-7 cm thick layers of rhizome should be spread for desirable colour of the dried product. Material should be heaped or covered during night time. For completely drying of rhizomes, it may take 10-15 days. Artificial drying through cross-flow hot air at 60°C temperature is also found to give a satisfactory product. In the case of sliced turmeric, artificial drying gives brighter coloured product than sun drying which later suffer from surface bleaching. The recovery of dry product varies from 20-25%. Manual or mechanical rubbing is done for improving appearance because dried turmeric has poor appearance. Manual polishing involves rubbing the dried turmeric fingers on a hard surface. Hand-operated barrel or drum mounted on a central axis, the sides of which are made of expanded metal mesh are the improved methods of polishing. Turmeric is filled in drum and the drum is rotated, polishing is effected by abrasion of the surface against the mesh as well as by mutual rubbing against each other as they roll inside the drum. The turmeric is also polished in power-operated drums. For improving yellow colour, turmeric suspension in water is added to the polishing drum in the last 10 minutes. The rhizomes are uniformly coated with suspension and dried in the sun.

### **Preservation of seed:**

Seed rhizomes seed are heaped under the shade of trees or in well-ventilated sheds and covered with turmeric leaves. The seed rhizomes are stored in pits with sawdust. The pits covered with wooden planks with one or two holes for aeration.

### **Yield:**

The yield of turmeric varies from 8000 to 10000 kg per acre.

### **Reference:**

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