
Turmeric (*Curcuma longa*) cultivation in Sindh Pakistan

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Turmeric (*Curcuma longa*) cultivation in Sindh Pakistan

Turmeric belongs to the family Zingiberaceae. It is used as a condiment, dye, and cosmetic. It can grow from sea level to 1500mm, it needs 20-30°C temperature with rainfall 1500mm or more per annum. It thrives on sandy or clayey loam, it can also grow on light black, loam red soils to clay loam. Turmeric is an annual crop, but conversion period requires 2 years. It requires 2500 Kg rhizomes per acre. It requires 2 years, minimum tillage, beds of 15cm height with 50 cm spacing between beds. It can grow in April-May under organic conditions it requires 5-6 tons/hectare FYM. With neem cake 2 tons/hectare. Some time it catches shoot borer, leaf spot and leaf blotch are controlled by 1% Bordeaux mixture spray. Its varieties mature at different times ranging from 7-9 months. Its average yield is 20-25 tons of green turmeric. Mother rhizomes are used as seed material. Its curing involves boiling of rhizomes in fresh water and drying under the sun. Under artificial conditions it should be dried at 60°C. Dried turmeric has poor appearance and rough dull color outside the surface with scales. Manual or mechanical rubbing and polishing improve appearance. Occasionally flowers come on cylindrical spikes bearing numerous greenish white bracts are narrow, yellowish-white in color. Most cultivated varieties are sterile tripods.

Varieties

The various varieties are: Amrutapani, Armoor, Duggirala, Tekkurpeta, Pattni, Deshi, Moovattupuzha, Allepey, Wynad, Rajpuri, Karhedi, Waigan, Chinnanadan, and Periandan., Alleppey finger, Erod turmeric, Rajapore. Sangli turmeric, Nibulb, taminadu, EPTS 10, Roma, Suguna, Sudarsana, Madras, Erode, Suvarna, Suguna, Sudarsana, IISR Prabha, Rajendra Sonia, Ranga, Rasmi., Suvarna, Suguna, Sudarsana, IISR Prabha IISR Prathibha, Co-1, Sugandham, Krisna, BSR-1, Roma, Suroma, Rajendra Sonia, Ranga, Rasmi.

Long duration type (9 months)

CLL 326

Plant grows to 60 cm height. Rhizomes are long, stout, smooth and pale yellow colour. Curcumin content 1.46%, yield 25-37 tonnes/hectare curing percentage 19.3. It is resistant to leaf blotch.

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CLL327

Curcumin content 3.0%. Yield 25-37 tons/hectare. Curing 21.8% resistant to leaf blotch disease.

Duggirala

It produces fast yellow coloured rhizomes, yield up to 25 tons/hectare.

Armoor

Yield 25-30 tons/hectare, rhizomes are fast yellow in colour. Yield 12-18 tons/hectare.

Medium duration types (8 months)

CLL 317

Plant grow up-to 57cm. Rhizomes are medium long curcumin content 13.8%, yield 25-35 tons/hectare. Curing is 19.6%. It is resistant to leaf spot and susceptible to leaf blotch.

Kesari

Rhizomes are thick and wrinkled. Yield 15-25 tons/hectare. It is susceptible to leaf spot.

Short duration (7 months)

CA 69

Plant grow up-till 50 cm, rhizomes are long, thin with shiny skin. Curcumin content 1.46%. Yield 15-20 tons/hectare, curing 26.7%. Crop tolerant to leaf spot and resistant to leaf blotch disease.

Kasturi

Yield 15-20 tons/hectare, rhizomes has aromatic flavour. Clone selection C1s No.2A, C1sNo.9A.G.L.Puram selection (Ca 66J, Ca 66A) yield 23-25 tons/hectare.

Suguna (PCT-13)

Suitable for rhizome rot effected area, 190 days duration, yield 29 tons/hectare, curing 20.4%.

Sudarsana (PCT-14)

Yield 28 tons/hectare, curing 20.6%

Early varieties matures in 7-8 months, 8-9 months and late varieties after 9 months. The average yield is 20 - 25 tonnes of green turmeric.

Following is the table showing varieties, their maturity, dry recovery, curcumin %, Oleoresin%, and essential oil %.

Varieties	Maturity (Days.)	Dry Recovery (%)	Curcumin (%)	Oleoresin (%)	Essential Oil %
Suvama	200	20.0	4.3	13.5	7.0
Suguna	190	12.0	7.3	13.5	6.0
Sudarsana	190	12.0	5.3	15.0	7.0
IISR Prabha	195	19.5	6.52	15.0	6.5
CO-1	285	19.5	3.20	6.7	3.2
Krishna	240	16.4	2.8	3.8	2.0
Sugandham	210	23.3	3.1	11.0	2.7
BSR-1	285	20.5	4.2	4.0	3.7
Roma	250	31.0	9.3	13.2	4.2
Suroma	253	26.0	9.3	13.1	4.4
Rajendra Sonia	225	18.0	8.4	-	5.0
Ranga	250	24.8	6.3	13.5	4.4
Rasmi	240	23.0	6.4	13.4	4.4

Turmeric produced in Bangladesh, India, Pakistan, Sri-Lanka, Taiwan, China, Indonesia, Caribbean, Las Jamaica, Haiti, Costa Rica, Peru, Brazil.

The color of rhizomes depends upon variety. The Selection of varieties based on color, aroma, yield and resistance to pest and diseases. Volatile oil content , which provide aroma varies 2.5% to 8.1% on dry matter basis. While volatile oil which produce aroma varies from 1.8% to 5.6%, on dry matter basis. NPK fertilizer helps in improving the quantity .Its disease are leaf blotch caused by *Taphirna-maculans*, leaf spot caused by *Collectoritcum Capsic*, shoot bores-*Dichocrocis punctifurolis*, leaf roller, caterpillar-*udapes folus* are common.

Processing of green turmeric

Green turmeric cured and dried for commercial used .Then boil into 30 minutes to 3 hours (This reduces the drying time without affecting colour or volatile oil content. Washing, curing and drying helps in reducing microbial load .Boiling helps to increase the rate of drying and provide hard, filled that can be polish easily. Slicing reduces processing costs and is used for material intended for Oleoresin or powder manufacturing. The product of commerce is in the form of dried bulb, fingers or powder. The bulb form is 3 cm in diameter and 4-5 cm long, the fingers are tapering cylinders 2.5 to 7.5 cm length and 7-15mm thick.

Rhizomes are treated with 0.3% Dithan m-45 and 0.5% Malathion, spacing 25 cm X 30 cm, spacing in furrow and ridges is 45-60cm between rows and 25 cm between plants. About 2,500 Kg rhizomes are required for planting one hectare.

Varieties are divided into long and short period of growth.

Propagation

It requires 7-8 cm long rhizomes, sprouting bud are selected for propagation. These rhizomes are dipped in 0.35 Dithane M-45, 0.5% Malthion for 30 minutes.

About 2500 Kg finger rhizomes require per hectare .The rhizomes are 30cm apart .Planting on raise beds of 1.7cm X 1.2 m X 0.2 m length with 30 cm wide channels in between, it needs 30 X 15 cm spacing.

Fertiliser

Crop requires 300Kg N, 125KgP₂O₅, 200 Kg K₂O per hectare. It requires 25 tones FYM.

Irrigation

It requires 15-20 irrigation for clay soil and 40 irrigation in sandy loam.

Pest and diseases

Name of pest/diseases	Symptoms of damage	Control measures
Pests		
Rhizome fly Mimergralla Concrulefrons	Maggots feed on rhizomes by boring. Result in dead hearts .Rhizomes also not due to the infestation	Selection of healthy rhizome for planting proper drainage should be provided. Application of phonate 10G 10Kg or Carbofuran 3G 33Kg/ha(iKg at/hac) or spray with Momocrootphos 0.05% 2ml/l water twice.
Beetle pest	This pest cause damage on cured produce in storage by making small holes in rhizomes and feeds on central portion resulting in loss or rhizomes weieght.	Pest can be controlled by durtung indicate (0.63% Gamma isomer) once in two months on foliage Endosulfan 4% dust
Leaf mite (pogachurutegulu)	It is caused by eriophyid mite, which eats away the cholorphyll.	These mites can be controlled by spraying the folliage with Methyl Prathion to ECO .0.5% 1ml?! or water.
Scale Aspidiella hartil C	Damages the rhizomes the rhizomes both in field and ins storage sucking the sap.	The pest can be controlled by dipping the seed Rhizomes in 0.5%.Malathion for 30 minutes prior to storage and at time of sowing.

Name of pest/diseases	Symptoms of damage	Control measures
Diseases		
Rhizomes rot Early wilt (Dumpa Kulu Tegulu)	In early stages of crop growth disease caused decay of pseudostem, resulting in the death of the plant.	Rotting of rhizomes can be Minimised by drenching the soil with 0.3% cheshnut compound or 0.3% Dithane M-45 at 15 days interval soon after the commencement of the diseases.
Leaf spot (Aaku Mache)	The incidence commences from 40-50 days after planting and spreads Rapidly in humid weather .OvbalsH-Aped spots with greenish colour in the center are developed.Affected leaves eventually dry up and yields are reduced	Disease spread can be arrested by giving 4-5 sprays Diathane Z-78 0.2% or Dithane M-45(0.25 at 15 days interval
Leaf blotch	This disease appears on leaves as small, rectangular or irregular brown spots on either side of the leaves and the spots turn to dark brown. In severe cases crop gives a scorched appearance and the yield are reduced considerably	Disease can be controlled by giving 4 to 5 sprays with Dithane M-45, 0.255 or Dithane Z-78 0.25% at 15 days interval.

Insects and pests

- Shoot borer (*Conogethes puttiferalis*) Control with 0.1% Malathion or 0.05% Monocrotophos or Dipel 0.3% (*Bacillus thuringiensis* product).
- Leaf roller (*Udaspes folus*), control with 0.1% Carbaryl
- Rhizome scale (*Aspidiella bartii*), control with 0.075% twice prior to storage and sowing.

Diseases

- Leaf blotch, caused by *Taprina maculans* , control by 0.2% Dithan M-45
- Leaf spot (*Colletotricium capsici*), controlled by 0.3% Zineb or 1% Bordeaux mixture
- Rhizome rot, caused by *Pbytbium gramini colum* control by rizome dip in 0.3% Dithane ,M-45 solution for 30 minjutes or 0.3% Cheshunt compound

Curing of fresh rhizomes

Within a week of harvest curing process to get turmeric of commence . Mother and finger are cured separately curing process consist of boiling the rhizomes in water till fruiting occur, with emission of characteristic, turmeric odour and finger become soft, material is Sun dry for 10 - 15 days on hard and smooth drying floor till the rhizomes produce metallic sound. After Sun dry these are polished in rotating drum then these can be store by heaping them under the shade of trees. Heaps are covered with turmeric leaf and plastered with earth and cow dung mixture.

Hydrated lime 400 Kg/Hactare has to laterite soil. Spacing in furrows and ridges is between 45 - 60 cm between the rows to rows 25 cm

Turmeric contains Zingiberene, α -turmerone, α -curcumene, Sabinene, 1,8-Cineol, pinene and beta-sesquiphellandrene. There are two types of turmeric produced, one has solid and dark colour, other long, soft and light colour

Process of turmeric

The process followed: washing, boiling, blanching, cooking, drying, polishing, colouring, grading, packing and storage .Turmeric Oleoresin is the organic extract of turmeric, a ground powder from the root of the curcuma plant is added to food item as a spice and colouring agent Processing includes

- Curing, it involves boiling of fresh rhizomes in water and drying in the Sun
- Drying, cooked fingers dried in the Sun by spreading 5-7 cm thick layer on bamboo mat or drying floor. Artificial had advantages giving brighter coloured then Sun drying.
- Polishing, Is done by mechanical rubbing, polished in power-operated drum. The yield of polish turmeric from the raw material varies 12-20%
- Colouring, Attractive yellow colour, turmeric suspension in water add to polishing drum in the last 10 minutes when rhizomes are uniformly coated with suspension, they may be dried in the Sun.

Medicinal properties

- Anticancer.
- Pharmacological
- Healing properties.
- Hypo-cholesterolmic.
- Inflamm-Ease
- Alzheimer
- Phytomedicine.
- Diabetes.
- Natural cure.
- Anti HIV.
- Herbclip
- Human Immunodeficiency.
- Phytonutrients from turmeric.
- Antioxidants.
- Galectin.

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