TURMERIC

Contract Farming with

RUPIYA

RUPIYA™

FINNOVATIONS PRIVATE LIMITED

एक कदम जैविक
खेती की ओर।

TURMERIC

Turmeric (Curcuma longa) (Family: Zingiberaceae) also known as 'Indian saffron' is used as condiment, dye, drug and cosmetic in addition to its use in religious ceremonies. Turmeric is the dried rhizome of this herbaceous perennial which is native to South Asia particularly India. India is a leading producer and exporter of turmeric in the world. The states of Telangana, Maharashtra, Tamil Nadu, and Andhra Pradesh together contributes 63.4% of India's turmeric production, other important turmeric producers are Orissa, Karnataka, West Bengal, Gujarat, Meghalaya, Assam

Site Selection

Select the site with proper water drainage, good humas percentage and sandy lome soil for the turmeric with irrigation facility.

Climate And Soil

Turmeric can be grown in diverse tropical conditions from sea level to 1500 m above sea level, at a temperature range of 20-35oC with an annual rainfall of 1500 mm or more, under rainfed or irrigated conditions. Though it can be grown on different types of soils,

it thrives best in well-drained red or clay loam soils with a pH range of 4.5-7.5 with good organic status. Soil with good drainage is essential.

Variety Selection

A number 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 Duggirala, Tekkurpet, Sugandham, Amalapuram, Erode local, Salem, Alleppey, Moovattupuzha and Lakdong. Improved varieties of turmeric released by different research organizations are also available

Seed Rate

Whole or split mother and finger rhizomes are used for planting and well developed healthy and disease free rhizomes are to be selected. Small pits are made with a hand hoe on the beds with a spacing of 25 cm x 30 cm. Pits are filled with well decomposed cattle manure or compost, seed rhizomes are placed over it then covered with soil. The optimum spacing in furrows and ridges is 45-60 cm between the rows and 25 cm between the plants. A seed rate of 2,500 kg of rhizomes is required for planting one hectare of turmeric.

Soil Conditions And Management

The soil analysis report of the selected site and analytical report on irrigation water should be available especially with respect to heavy metals and pesticide residues contents. The quantity, quality and type of soil amendments used for the selected site need to be Recorded performed need to be recorded.

Land Preparation

The land is prepared with the receipt of early monsoon showers. The soil is brought to a Fine tilth by giving about four deep ploughings. Hydrated line at rate 500 – 1000 kg/hg has to be applied for laterite soils based on the soil pH and thoroughly ploughed.

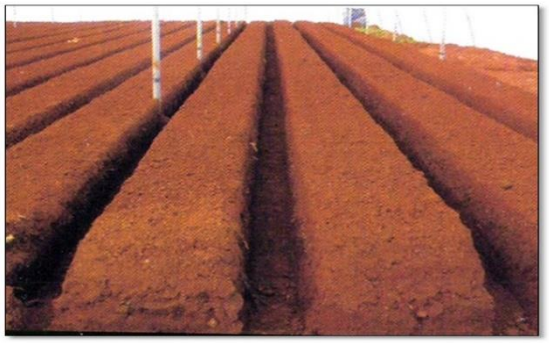
Light soils : Beds of 1.0 m width, 30 cm height and of convenient length are prepared with spacing of 50 cm between beds. Rhizomes are planted at 25 cm x 30 cm.

Loamy soils : Flat beds of 3 x 1.8 m size are prepared providing necessary irrigation channels. Rhizomes are dibbled at 15 cm apart in the plough furrows spaced 30cm apart.

Heavy soils: Ridges and furrow system is adopted and rhizomes are sown at 15 to 20 cm spacing. Spacing between ridges is maintained at 45 to 60 cm.

In alternate method, in wet lands, rhizomes are planted on raised beds of 1.2 m with 30 cm height with convenient length, 30cm wide channels are provided in between.

Planting is done with 30 x 15 cm spacing.



Basal Dose

During bed preparation, apply the following per acre:

25 tons of Farm Yard Manure (FYM)
200 kg of either Neem or Groundnut Cake
10 kg of Sulphur
100 kg of Single Super Phosphate (SSP)
5 kg of Neemocin
50 kg of 10:26:26 fertilizer
50 kg of Potash

These quantities ensure the soil receives the necessary organic matter and nutrients for optimal plant growth when preparing the bed.

Fertigation:

Fertigation is done as per the recommended dose with 150:60:108 kg of NPK/ha and is applied throughout the cropping period once in three days.

75 % of the recommended dose of phosphorous is applied as basal dose. Water soluble fertilizers like 19:19:19, Mono ammonium phosphate (12:61:0), Multi K (13:0:45) and urea are used.

Pre planting treatment

The seed rhizomes are dipped in Carbendazim 1 g/lit and Chloro 20 % EC 2 ml/lit for controlling rhizome rot and scales

Mulching

The crop is to be mulched immediately after planting with green leaves @ 12-15 t/ha. Mulching may be repeated @ 7.5 t/ha at 45 and 90 days after planting after weeding, application of fertilizers and earthing up.

Weeding and irrigation

Weeding has to be done thrice at 60, 90 and 120 days after planting depending upon weed intensity. In the case of irrigated crop, depending upon the weather and soil conditions, about 15 to 23 irrigations are to be given in clayey soils and 40 irrigations in sandy loams.

Organic Production

For certified organic production, at least 18 months the crop should be under organic management ie only the second crop of turmeric can be sold as organic. The conversion period may be relaxed if the organic farm is being established on a land where chemicals were not previously used, provided sufficient proof of history of the area is available. It is desirable that organic method of production is followed in the entire farm; but in the case of large extent of area, the transition can be done in a phased manner for which a conversion plan has to be prepared.

Turmeric as a best component crop in agri-horti and silvi-horti systems, recycling of farm waste can be effectively done when grown with coconut, arecanut, mango, Leucaena, rubber etc. As a mixed crop it can also be grown or rotated with green manure/ legumes crops or trap crops enabling effective nutrient built up and pest or disease control. When grown in a mixed cultivation system, it is essential that all the crops in the field are also subjected to organic methods of production.

In order to avoid contamination of organically cultivated plots from neighboring non-organic farms, a suitable buffer zone with definite border is to be maintained. Crop grown on this isolation belt cannot be treated as organic. In sloppy lands adequate precaution should be taken to avoid the entry of run off water and chemical drift from the neighboring farms. Proper soil and water

conservation measures by making conservation pits in the interspaces of beds across the slope have to be followed to minimize the erosion and runoff. Water stagnation has to be avoided in the low lying fields by taking deep trenches for drainage.

Harvesting

Depending upon the variety, the crop becomes ready for harvest in 7-9 months after planting during January-March. Early varieties mature in 7-8 months, medium varieties in 8-9 months and late varieties after 9 months.

The land is ploughed and the rhizomes are gathered by hand picking or the clumps are carefully lifted with a spade. The harvested rhizomes are cleared of mud and other extraneous matter adhering to them.

Processing

Curing

Fresh turmeric is cured for obtaining dry turmeric. The fingers are separated from mother rhizomes. Mother rhizomes are usually kept as seed material. Curing involves boiling of fresh rhizomes in water and drying in the sun.

In the traditional method of curing, the cleaned rhizomes are boiled in water just enough to immerse them. Boiling is stopped when froth comes out and white fumes appear giving out a typical odour. The boiling should last for 45-60 minutes when the rhizomes turn soft. The stage at which boiling is stopped largely influences the colour and aroma of the final product. Over cooking spoils the colour of the final product while under-cooking renders the dried product brittle.

In the improved scientific method of curing, the cleaned fingers (approximately 50 kg) are taken in a perforated trough of 0.9 m x 0.5 m x 0.4 m size made of GI or MS sheet with extended parallel handle. The perforated trough containing the fingers is then immersed in a pan; 100 litres of water is poured into the trough so as to immerse the turmeric fingers. The whole mass is boiled till the fingers become soft. The cooked fingers are taken out of the pan by lifting the trough and draining the water into the pan. The water used for boiling turmeric rhizomes can be used for curing fresh samples. The processing of turmeric is to be done 2 or 3 days after harvesting. If there is delay in processing, the rhizomes should be stored under shade or covered with sawdust or coir dust.

Drying

The cooked fingers are dried in the sun by spreading them in 5-7 cm thick layers on bamboo mats or drying floor. A thinner layer is not desirable, as the colour of the dried product may be adversely affected. During night time, the rhizomes should be heaped or covered with material which provides aeration. It may take 10-15 days for the rhizomes to become completely dry. Artificial drying, using cross-flow hot air at a maximum temperature of 60oC also gives a satisfactory product. In the case of sliced turmeric, artificial drying has clear advantages in giving a brighter coloured product than sun drying which tends to undergo surface bleaching. The yield of the dry product varies from 10-30% depending upon the variety and the location where the crop is grown.

Polishing

Dried turmeric has a poor appearance and a rough dull outer surface with scales and root bits. The appearance is improved by smoothening and polishing the outer surface by manual or mechanical rubbing.

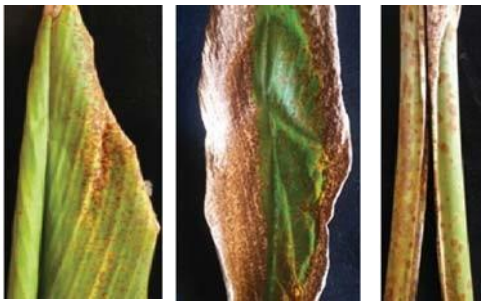
Manual polishing consists of rubbing the dried turmeric fingers on a hard surface. The improved method is by using a hand operated barrel or drum mounted on a central axis, the sides of which are made of expanded metal mesh. When the drum filled with turmeric is rotated, polishing is effected by abrasion of the surface against the mesh as well as by mutual rubbing against each other as they roll inside the drum. Turmeric is also polished in power operated drums. The yield of polished turmeric from the raw material varies from 15-25%.

Plant Protection

Disease Management

Leaf blotch

Leaf blotch is caused by Tapkrina maculans and appears as small, oval,rectangular or irregular brown spots on either side of the leaves which soon become dirty yellow or dark brown. The leaves also turn yellow. In severe cases the plants present a scorched appearance and the rhizome yield is reduced.



Leaf spot

Leaf spot is caused by Colletotrickum capsici and appears as brown spots of various sizes on the upper surface of the young leaves. The spots are irregular in shape and white or grey in the centre. Later, two or more spots may coalesce and form an irregular patch covering almost the whole leaf. The affected leaves eventually dry up. The rhizomes do not develop well.
Leaf spot disease Leaf spots leading to blighting

Leaf blight

Leaf blight is caused by Rkizoctonia solani. The disease is characterized by the appear- ance of necrotic patches with papery white centre of varying sizes on the lamina which spread on the whole surface leaving a blighted appearance. The disease occurs during the post monsoon season.

Rhizome rot

The disease is caused by Pytkium apkanidermatum. The disease starts at the collar region of the pseudostem and progresses upwards as well as downwards. The collar region of the affected pseudostem becomes water soaked and the rotting spreads to the rhizome resulting in soft rot. At a later stage root infection is also noticed. Foliar symptoms appear as light yellowing of the tips of lower leaves which gradually spreads to the leaf blades. In early stages of the disease, the middle portion of the leaves remain green while the margins become yellow. Later, the yellowing spreads to all leaves of the plant from the lower region upwards and is followed by drooping, withering and drying of pseudostems. Collar region of the pseudo stem becomes soft and water soaked, resulting in collapse of the plant and decay of rhizomes. Rhizome rot affected plants will be seen as circular patches inside healthy fields. The disease is soil-borne and rhizomes borne and occurs with the onset of monsoon.

Nematodes

Root knot nematodes (Meloidogyne spp.) and burrowing nematode (Radopkolus
similis) are the two important nematodes causing damage to turmeric. Root lesion nematodes (Pratylenckus spp.) are of common occurrence in Andhra Pradesh and Tamil Nadu. Root-knot nematode feed on tender rhizomes, roots and base

of pseudostem causing stunting, chlorosis, poor tillering and necrosis of leaves are the common aerial symptoms. Characteristic root galls and lesions that lead to rotting are generally seen in roots. The infested rhizomes have brown, water soaked areas in the outer tissues. Nematode infestation aggravates rhizome rot disease. Nematodes survive in soil and infected rhizomes as primary inoculum. It spreads from infected plants or through soil


Management

- Avoid planting turmeric after Banana or solanaceous vegetables.
- Apply neem cake @150 kg/ha
- Plant marigold as inter/ border crop
- Apply Rupiya Root Guard Shakti @750 ml per acre in soil treatment

Pest Management

Shoot borer

The shoot borer (Conogetkes punctiferalis) is the most serious pest of turmeric. The larvae bore into pseudo stems and feed on internal tissues. The presence of a bore-hole on the pseudo stem through which frass is extruded and the withered central shoot is a characteristic symptom of pest infestation.

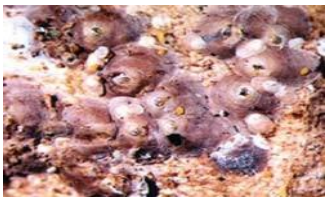
Bore-hole on the pseudostem Shoot borer larvae

Management

Spray chlorantraniliprole or flubendiamide or spinosad (0.3 mL/ L) at 15 days intervals during July to October. Initiate spraying when the first symptom of pest attack is seen on the inner most leaf.


Rhizome scale

The rhizome scale (Aspidiella kartii) infests rhizomes in the field (at later stages of the crop) and in storage. Adult (female) scales are circular and light brown to grey and appear as encrustations on the rhizomes. They feed on sap and when the rhizomes are severely infested, they become shrivelled and desiccated affecting its germination.

Management

- Adapt timely harvest of rhizomes
- Before storage, discard severely infested rhizomes
- Treat seed material with insecticides for 20-30 minutes before storage and also before sowing in case the infestation persists.

Minor pests Leaf thrips

The turmeric thrips (Panckaetotkrips indicus) infests the leaves causing them to roll, turn pale and gradually dry up. The pest infestation is more common during the post monsoon period especially in drier regions of the country.

Management

- Set blue sticky traps (5 no./acre)
- Spray neem oil 3.0 % or NSKE 5.0 %

Leaf feeding beetle

Adults and larvae of leaf feeding beetles such as Lema spp. feed on leaves especially during the monsoon season and form elongated parallel feeding marks on them.

Leaf feeding beetle

Sprays undertaken for the management of shoot borer is sufficient to manage this pest.
Lacewing bug (Stephanitis typicus)
The pest infests the foliage causing them to turn pale and dry up. The pest infestation is more common during the post monsoon period especially in drier regions of the country.

Management
Spray neem oil 3.0 % or Rupiya Beauv 1 liter per acre.

Leaf roller

In Infected plants, the leaf rolled longitudinally and the larvae feed within the folded portion.
Management
Spray taken for shoot borer can manage leaf roller infestation

Cleaning, grading, packing and storage

Although Indian turmeric is considered to be the best in the world, about 90% of the total produce is consumed internally and only a small portion of the production is exported. Turmeric of commerce is described in three ways: Fingers: These are the lateral branches or secondary 'daughter' rhizomes which are detached from the central rhizome before curing. Fingers usually range in size from 2.5 to 7.5 cm in length and may be over 1 cm in diameter.
Bulbs: These are central 'mother' rhizomes, which are ovate in shape and are of shorter length and having larger diameter than the fingers.
Splits: Splits are the bulbs that have been split into halves or quarters to facilitate curing and subsequent drying.

Quality and Grading

Turmeric Grader

Turmeric Farming with Rupiya

Crop production – Turmeric

Crop	Turmeric
Area	1 Acre
Variety	Rupiya Suggested
Soil	sandy or clay loam, red loam or lateritic loam
Climate	warm and humid climates
Seed Rate	600 to 1000 kg per acre
Sowing time	April to May
Crop Duration	10 -12 months

Cost of Cultivation per acre

Details	Cost
Seed	35000
Input	44925
Drip	10000
Manpower	10000
Harvesting	20000
Rent	18000
Insurance	12500
Land Preparation	9000
Total	**159425**

Income per acre

Particulars	Calculations
Total Cost of Cultivation	159425 Rs
Total production per QTL per acre	30 QTLs
Rate offered by Rupiya per QTL	7000 Rs
Total income from one acre	210000Rs
Total profit	**Rs 50575**

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