# CULTIVATION OF ORGANIC TURMERIC

C.K.Thankamani, V.Srinivasan, S.Hamza, R.Dinesh and R.Praveena*

## Introduction

India is the major producer, consumer and exporter of spices in the world, growing about 60 different varieties of spices and produces about 60 lakh MT of spices, of which, about 6.9 lakh MT(11%) is exported to more than 150 countries. Since organic foods are free from chemical contaminants, the demand for these products is steadily increasing. Organic farming is a form of agriculture that relies on techniques such as crop rotation, green manure, compost and biological pest control. In this system only natural fertilizers and pesticides are allowed, but it excludes or strictly limits the use of synthetic fertilizers and pesticides, plant growth regulators such as hormones, genetically modified organisms, human sewage sludge and nano materials .The organic farming does not aim only at higher crop yield or returns but also developing long term self-sustainable practices. With the increasing demand for organic foods, the demand for spices and spice products are also steadily increasing.

Organic farming may be defined as a kind of diversified agriculture wherein crop and livestock are managed through use of integrated technologies with preference to resources available either at farm or locally. The organic community has adopted the principles to enhance the health of soil, plant, animal, and human beings. In organic farming, the soil is keeping alive through effective management of natural resources such as effective soil enrichment, management of temperature, conservation of soil and rain water, harvesting of sun energy, self reliance in inputs, maintenance of life forms, integration of animals and use of renewable energy. Turmeric (*Curcuma longa*) (Family: Zingiberaceae) is used as condiment, dye, drug and cosmetic in addition to its use in religious ceremonies. India is a leading producer and exporter of turmeric in the world. Andhra Pradesh, Tamil Nadu, Odisha, Karnataka, West Bengal, Gujarat, Meghalaya, Maharashtra, Assam are some of the important states cultivating turmeric, of which, Andhra Pradesh alone occupies 38.0% of area and 58.5% of production. During 2014-2015, the country produced 8.30 lakh tonnes of turmeric from an area of 1.84 lakh ha. India exports only 6.48% of its production of turmeric to more than 50 countries mainly as dry produce (63%) and powder (37%). The share of organic turmeric is only 11 per cent compared to conventional turmeric. There is a great demand for organic turmeric in USA, Germany, France and Japan and there is a growing demand for organic spices in the market. Growing demand for natural colours in industry, fast food chains, pharmaceuticals offer a potential scope for organic production of turmeric. Organic cultivation practices of turmeric is summarised below.

* ICAR-Indian Institute of Spices Research, P.O.Marikunnu, Kozhikode-673012.

**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 20-35$^0$C 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 sandy or clay loam soils with a pH range of 4.5-7.5 with good organic status.

**Varieties**

Many local cultivars of turmeric are known mostly by the names of locality. Important local cultivars are Duggirala, Tekkurpet, Sugandham, Amalapuram, Erode local, Moovattupuzha,Lakadong etc. Varities tolerant to pest and diseases may be selected in organic farming. Suvarna, Suguna, Sudarsana, IISR Prabha, IISR Prathibha, IISR Alleppey Supreme, IISR Kedaram and IISR Pragathi are the improved varieties of turmeric released from ICAR-IISR, Kozhikode. Co 1, BSR 1, and BSR-2 are the varieties released from TNAU, Coimbatore. Roma, Suroma, Ranga, Rasmi and Surangi are the varieties released from High Altitude Research Station, OUAT, Pottangi. Kanti, Sobha, Sona and Varna are varieties released from KAU, Thrissur. For organic production, traditional varieties adapted to the local soil and climatic conditions that are resistant or tolerant to diseases, pests and nematode infection should be used.

**Conversion plan**

For certified organic production, at least 18 months the crop should be under organic management i.e. 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 is the 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.

**Seed material**

Healthy and disease free rhizome selected for seed may be treated with 1% Bordeaux mixture for 20 minutes dried in shade and may be stored with layers of sand or sawdust under shade or ground pits of 1 x1x1m size. Temperature of the area for storing turmeric may be regulated below 25$^0$C. The pits are to be covered with wooden planks with one or two openings for aeration. However there is a practice of storing rhizomes under the shade of the trees or well ventilated rooms covered with turmeric leaves. The seed rate varies from 1500-2500 kg per hectare.

**Transplanting technique**

Though transplanting in turmeric is not conventional, it is found profitable. A transplanting technique in turmeric by using

single bud sprouts (about 5 g) has been standardized to produce good quality planting material with reduced cost. The technology has been standardized at Horticulture College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu. The technique involves raising transplants from single sprout seed rhizomes in the pro-tray and planted in the field after 30-40 days. The advantages of this technology are production of healthy planting materials and reduction in seed rhizome quantity and eventually reduced cost on seeds.

**Preparation of land and planting**

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. If the soil pH is less than 5, hydrated lime or dolomite @ 1000 kg/ha has to be applied for laterite soils and thoroughly ploughed. In Kerala immediately with the receipt of pre-monsoon showers, beds of 1.0 m width, 30 cm height and of convenient length are prepared with spacing of 50 cm between beds, small pits are made with a hand hoe on the beds with a spacing of 25 cm x 25 cm. Pits are filled with well decomposed cattle manure or compost, seed rhizomes are placed over it then covered with soil. In the case of irrigated crop, ridges and furrows are prepared and the rhizomes are planted in shallow pits on the top of ridges .The optimum spacing in ridges and furrows system of planting are between 45 and 60 cm between the rows and 25 cm between the plants. While planting the seed can be dipped for 15 minutes in PGPR strain GRB 35 or GEB 17 developed by IISR (cfu $10^7$) for enhancing growth and suppressing diseases.

**Manuring**

Based on soil test, application of lime/ dolomite, rock phosphate and wood ash has to be done to get required quantity of phosphorus and potassium supplementation. At the time of planting, well decomposed cattle manure or compost @ 25-30 tonnes/ha has to be applied in pits at the time of planting. Application of neemcake @ 2 tonnes/ha at the time of planting helps in reducing the incidence of rhizome rot disease/ nematode and increasing the yield. In soil having potassium deficiency sulphate of potash may be applied @ 200 kg/ha in two splits during 40th and 90th days after planting (Table 1). When the deficient conditions of trace elements become yield limiting, restricted use of mineral/chemical sources of micronutrients by soil application or foliar spray are allowed as per the limits of standard setting or certifying organizations. Turmeric micronutrient mixture developed by IISR to be sprayed @ 5g/litre of water during 60 and 90 days after planting to get 15-25% increased yield.

**Table 1. Manure schedule for turmeric (per ha)**

| Schedule | | | | |
|---|---|---|---|---|
| Basal application | 2 tons Neemcake | 250kg Rock phosphate | | 30-40 tonnes Compost/cowdung |
| After 40 days | - | - | 0.5-1ton Ash | 2 tons Vermicompost |
| After 90 days | - | - | Sulphate of Potash 100kg | 2 tons Vermicompost |

**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 40 and 90 days after planting. After weeding, application of manures at 45 and 90 days after planting and earthing up may be done for proper aeration and for the development of rhizomes.

**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 the soil conditions, about 15 to 23 irrigations are to be given in clayey soils and 40 irrigations in sandy loams.

**Mixed cropping**

Turmeric can be grown as an intercrop in coconut and arecanut plantations. It can also be raised as a mixed crop with chillies, colocasia, onion, brinjal and cereals like maize, ragi, etc.

**Plant protection**

Use of biopesticides, biocontrol agents, cultural and phytosanitary measures for the management of insect pests and diseases forms the main strategy under organic system. Spraying Neemgold 0.5% or neemoil 0.5% during July-October (at 21 day intervals) is effective against the shoot borer. Selection of healthy rhizomes, soil solarization and incorporation of *Trichoderma*, seed treatment and soil application of biocontrol agents like *Trichoderma* or *Pseudomonas* multiplied in suitable carrier media such as coir pith compost, well rotten cow dung or neem cake may be done at the time of sowing and at regular intervals to control the rhizome rot disease. To control other foliar diseases spraying of Bordeaux mixture 1% may be done. Application of quality neem cake mentioned earlier along with the bioagents *Pochonia chlamydosporia* will be useful to check the nematode population.

**Harvesting**

Depending upon the variety, the crop becomes ready for harvest in 7-9 months after planting during January-March. Early varieties Suvarna, Suguna, Sudarsana, IISR Prabha , IISR Prathibha, IISR Alleppey Supreme, IISR Kedaram and IISR Pragathi mature in 7-8 months, medium varieties CO-1 and BSR-1 in 8-9 months and late varieties Roma, Suroma, Ranga and Rasmi 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.

**Preservation of seed rhizome for next season**

In order to obtain good germination, the seed rhizomes are to be stored by heaping in well ventilated rooms and covered with turmeric leaves. The seed rhizomes are placed in pits in layers along with well dried sand/saw dust (put seed rhizomes one feet height, then put 5 cm thick layer of sand/saw dust. The pits can be covered with wooden planks with one or two small openings for aeration.

**Certification:**

Certification and labelling is usually done by an independent body to provide a guarantee that the production standards are met. Government of India has taken steps to have indigenous certification system to help small

and marginal growers and to issue valid organic certificates through certifying agencies accredited by APEDA (Agricultural and Processed Food Products Export Development Authority). The inspectors appointed by the certification agencies will carry out inspection of the farm operations through records maintained and periodic site inspections. The growers has to document all the details with respect to the field map, field history sheet, activity register, input record, pest control records, movement record, equipments cleaning record and labelling records etc. Documentation of farm activities is must for acquiring certification especially when both conventional and organic crops are raised. Group certification programmes are also available for organized group of producers and processors with similar production systems located in geographical proximity.

**Labelling:**

Labelling shall convey clear and accurate information on the organic status of the product. When the full standards requirements are fulfilled, products shall be sold as "produce of organic agriculture" or a similar description. The use of in-conversion labels may be confusing to the consumer and is not recommended. The name and address of the person or company legally responsible for the production or processing of the product shall be mentioned on the label. Product labels should list processing procedures which influence the product properties in a way not immediately obvious. Additional product information shall be made available on request. Organic products shall not be labelled as GE (genetic engineering) or GM (genetic modification) free in order to avoid potentially misleading claims about the end product. Any reference to genetic engineering on product labels shall be limited to the production method. Some of the accredited certification bodies under NPOP (National Programme for Organic Production) are listed below :