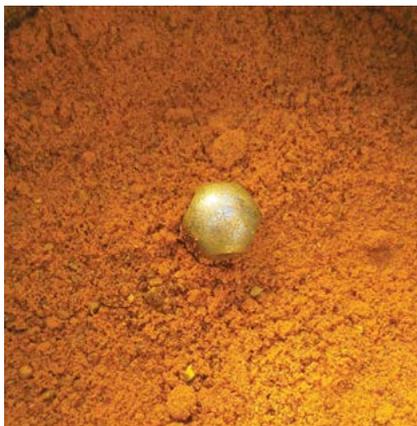


Fertilizing Turmeric with Polyhalite for High Yield and Quality



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Turmeric, a High Value Crop



Freshly ground turmeric powder

Turmeric is a flowering plant, *Curcuma longa* of the ginger family, Zingiberaceae, the rhizomes of which are used in cooking and in Ayurvedic medicine,

Turmeric powder is a unique and versatile natural plant product combining the properties of a spice or flavourant, a colourant of brilliant yellow dye, a cosmetic and a drug. Indian turmeric is considered the best in the world. The important quality attributes of turmeric are size, physical form, color, curcumin

content, maturity, weight or bulk density, length and thickness, intensity of color of the core and aroma.

Turmeric contains two primary constituents, colouring matter and volatile oil. The volatile oil of turmeric is about 1.5 – 6.0% and is composed of a variety of sesquiterpenes, many of which are specific for the species. Conjugated di-aryl heptanoids (1,7-diaryl-hepta-1,6-diene-3,5-diones, e.g., curcumin) are responsible for the orange colour and probably also for the pungent taste (3 to 4%). The crystalline coloring matter, curcumin, is a diferuloyl methane. The rhizomes contain curcuminoids, curcumin, dimethoxy curcumin, bis- desmethoxycurcumin, 5- methoxy curcumin and dihydrocurcumin which are found to be natural antioxidants.

Some of the well-accepted varieties are «Erode turmeric» from the state of Tamil Nadu, «Rajapore» and «Sangli turmeric» from the state of Maharashtra and «Nizamabad Bulb» from the state of Andhra Pradesh. India exports turmeric as turmeric powder in large quantities to many countries. The major trading hubs of turmeric in India are mainly Salem, Erode, Dharmapuri and Coimbatore (Tamil Nadu), Nizamabad (Telangana), Duggirala (Andhra Pradesh), and Sangli (Maharashtra).

Turmeric Cultivation



Turmeric crop

Turmeric cultivation is confined to Southeast Asian countries such as India, Sri Lanka, China, and Indonesia. The main turmeric growing states in India are in the south especially Tamil Nadu, Andhra Pradesh, Maharashtra, Orissa, Karnataka, and Kerala. Turmeric requires a hot and moist climate, loamy or alluvial, loose, friable, and fertile soils. Turmeric requires a soil which has deep tilth and heavy manuring for high yields. Beds of convenient length and width are prepared based on the topography of the land. Planting is done either on raised beds or on ridges. Turmeric is propagated vegetatively through rhizomes. The crop becomes ready for

harvest in about 8-9 months after planting. The main harvest season begins from January and extends up to mid of April.



Fresh and baked rhizomes

Turmeric is harvested when leaves start drying up. The whole matured rhizome is lifted out with the dry plant after maturity, then the leafy tops are cut off, the roots are removed, boiled, dried, and powder.

Climate, Soil, and Fertilizer Requirement



Soil ready for turmeric planting in Tamil Nadu

Turmeric can be grown in diverse tropical conditions from sea level to 1500 m, with a rainfall of 1500 mm or more per annum, or under irrigated conditions. It is grown on different types of soils from light black, ashy loam and red soils to clay loams. However, turmeric grows well in well-drained sandy or clay loam soils. Cattle manure (FYM) or compost @ 10-20 tons per hectare is applied by broadcasting

and ploughing at the time of preparation of land or as basal dressing by spreading over the beds to cover the seed after planting. Recommended nutrient doses are: 60 kg N, 50 kg P₂O₅ and 120 kg K₂O per hectare.

Polyhalite, a New Multi-Nutrient Fertilizer



Polyhalite is a naturally occurring mineral fertilizer with four essential nutrients: sulphur, potassium, magnesium and calcium. It contains 18.5% S, 13.5% K₂O, 5.5% MgO and 16.5% CaO, all in sulphate (SO₄²⁻) form. Being a natural crystal, polyhalite has a unique dissolution pattern, releasing its nutrients gradually after being applied to the soil along the crop cycle. It is a low carbon footprint fertilizer, with neutral pH and has very low chloride content.

Polyhalite for Turmeric

An experiment conducted in Erode, Tamil Nadu by Annamalai University and IPI showed that the crop responds significantly to the application of polyhalite. The rhizome yield and quality (curcumin content) increased with the application of polyhalite.

The outstanding performance of the polyhalite treatments stems from the fact that the experimental soil had low potassium level, the additional nutrients supplied by the polyhalite (S, Mg and Ca) and the gradual release of nutrients from polyhalite which avoids their loss by leaching.

- The application of polyhalite enhanced the plant height and the chlorophyll content (as measured with SPAD device).
- Plants of all treatments with combined polyhalite and MOP had significantly higher yields compared to the MOP-applied plants, and plants without K application displayed the smallest yield.
- The curcumin contents were lowest without K (T1 and T2), intermediate under MOP, and significantly higher under MOP and polyhalite combinations.
- The best treatment was T10 (150% of K recommended dose, applied 1/3 as MOP and 2/3 as polyhalite) showing **85% increase in yield and 70% increase in curcumin content** as compared to T2 (K₀).

Fertilizer treatments		Cured yield (t ha ⁻¹)	Curcumin content (%)
T1	Control	2.50	1.80
T2	N, P, K=0	3.61	2.41
T3	N, P, K=100% RD (181 kg ha ⁻¹ MOP)	4.94	3.10
T4	N, P, K=50% (90 kg ha ⁻¹ MOP)	4.19	2.73
T5	N, P, K=50% (380 kg ha ⁻¹ polyhalite)	4.60	2.94
T6	N, P, K=100% (750 kg ha ⁻¹ polyhalite)	5.69	3.58
T7	N, P, K=100% (1/2 K ₂ O as MOP and 1/2 as polyhalite) (90 kg ha ⁻¹ MOP + 380 kg ha ⁻¹ polyhalite)	5.33	3.36
T8	N, P, K=150% (250 kg ha ⁻¹ MOP)	6.10	3.86
T9	N, P, K=150% (2/3 K ₂ O as MOP and 1/3 as polyhalite) (180 kg ha ⁻¹ MOP +380 kg ha ⁻¹ polyhalite)	6.60	4.00
T10	N, P, K=150% (1/3 K₂O as MOP and 2/3 as polyhalite) (90 kg MOP + 750 kg ha⁻¹ polyhalite)	6.67	4.10
<i>CD (P=0.05)</i>		<i>0.36</i>	<i>0.20</i>

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