

Factors Affecting Growth, Yield and Quality of Turmeric (*Curcuma* spp.)

Md. Amzad Hossain*

Faculty of Agriculture, University of the Ryukyus, Okinawa, Japan

Abstract

Turmeric (*Curcuma* spp.) is an important plant having both medicinal and food values. It is widely cultivated throughout the tropical and subtropical regions of the world, especially in Asian countries, mainly in China, India, Pakistan, Bangladesh and Myanmar. The processed rhizome of this plant is commonly used in Asian cuisine as an important constituent of curry powder, dye for food and textile, and as cosmetics additive. The plant contains bioactive molecules that possess pharmacological properties like antioxidant, anti-inflammatory, antimicrobial, anti-fertility, anti-venom, hypocholestraemic, hypolipidemic, antirheumatic, antiviral, antifibrotic, antivenomous, antihepatotoxic, antidiabetic, antinociceptive, anticancerous, and gastroprotective properties, antialzheimer anticoagulant, digestive stimulant. The plant has also shown to possess anti HIV activity to combat AIDS. Turmeric demand is increasing in the world day by day due to the medicinal values. Therefore, it is necessary to improve yield and quality of turmeric. It is very general that growth, yield and quality of a plant species differ with the climatic and edaphic factors, cultivation methods, fertilizer managements, etc. In this paper, planting time, relative light intensity, soil types, chemical fertilizer, farmyard manure and green manure have been evaluated on growth, yield and quality of turmeric in Okinawa, Japan. Turmeric planted in different months withered in December and January. Shoot and yield of turmeric plants were significantly higher in the April planting followed by the March and February plantings than in the late planting. Turmeric shoot biomass, yield and curcumin content increased markedly at 59–73% relative light intensity (RLI) as compared with the control plant. However, the degree of RLI required for better turmeric cultivation may vary with the place, year and irradiance level. Turmeric cultivated in dark-red soil (pH 5.2) provided significantly highest yield with higher curcumin content than in gray soil (pH 7.4) and red soil (pH 4.4). Seed rhizome of 30-40g or mother seed-rhizome (shoot base) provided higher shoot and yield of turmeric. Seed rhizomes planted at 8-12 cm depth in a triangular patten on two-row ridge with 75-100 cm width provided higher yield. The combined application of fertilizer N and K (NK) or N, P and K (NPK) provided 4-6 times greater shoot and 8-9 times higher yield. The fertilizer K resulted highest curcumin content in rhizome but did not provide considerable yield. Cow manure, goat manure and chicken manure improved soil physical and chemical properties and provided nutrients which resulted in significantly higher yield. *Crotalaria spectabilis* L.) and hairy vetch (*Vicia villosa* R.) green manures maintained soil pH at 6.5-7.0 and reduced the soil bulk density by 19%. Shoots remained green 30 days longer, and shoot and yield increased by 173-197 and 28-86%, respectively, when turmeric was grown with the green manures. Hairy vetch alone provided 46% higher yield, while *crotalaria* provided similar yield, compared to the fertilizer treatment. Curcumin concentration (%) in the rhizomes was lower by 4-54%. The above results indicate that yield and quality of turmeric differ significantly with the climatic and edaphic factors, and management practices.

Keywords: Anti-inflammatory, Antioxidant, Curcumin

*Corresponding Authors: amzad@agr.u-ryukyu.ac.jp