Agritech, June, 2026, Vol.3(2): 7-9

Mechanization of Turmeric Planting

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Turmeric (*Curcuma longa*) is a perennial herb belongs to ginger (Zingiberaceae) family. Turmeric is also as Indian saffron and Haldi. Turmeric can be grown in diverse tropical condition up to 1500 m above sea level, with annual rainfall of 1500 mm and temperature ranges from 20 to 35 ℃. It can be cultivated in different soils such as light to clay loam, sandy, ash loam and light black. The spacing between row to row is 450 to 600 mm and plant to plant is 150 to 200 mm. 2000 to 2500 kg turmeric rhizome required for sowing one hectare (Jayashree et al., 2016). Annual production of turmeric estimated 13.5 lakh tonnes worldwide. India is the highest producer of turmeric accounting for 80% followed by China (8%), Myanmar (4%) and Bangladesh and Nigeria (3%) each. In India total area under turmeric cultivation is 3.05 lakh hectares with production of 10.54 lakh tonnes in 2023-24 seasons (Director of Economics and Statistics). Major turmeric producing states in India is Odisha, West Bengal, Assam, Karnataka, Andhra Pradesh, Tamil Nadu, Maharashtra and Telangana.

For successful turmeric cultivation sowing or planting is critical components which influence the quality, yield and health of crop. The conventional sowing method is time consuming and labour intensive. The workers have to dig the soil to sow the turmeric rhizome in the field. A man day is considered as 8 hours of working a day. 55 man days are required for sowing one hectare of land (Mathanker and Mathew, 2002). Due to increase in industries and opportunities in urban livelihood, decrease labour availability in agricultural sector. Hence to reduce the cost of cultivation by minimizing the dependency on human power can be achieved by increased mechanization.

Planting Methods

Turmeric cultivation uses different planting methods that influence yield, plant growth and pest incidence. Different planting methods are as follows.

Flatbed planting method – Planting is carried out by dibbling the turmeric rhizome in furrow made by the country plough. The rhizome is then covered by loose soil taken from the ridge. The row to row and plant to plant spacing is 30 cm and 15 cm respectively.

Ridge and furrow method – In this method tractor mounted ridger is used to prepare ridges and furrows. The row to row and plant to plant spacing is 45 cm and 20 cm respectively.

Raised bed method – In this method raised bed is prepared with 30 cm height and 1 m width. Four rows with 30 cm spacing are planting on bed.

Flatbed planting method can increase productivity but it also associated with higher risk of pest and disease incidence (Gill et. al., 2004) Ridge-and-furrow planting improves soil aeration and drainage, which enhances rhizome health and productivity. This method also improves leaf number, leaf breath, plant height and number of clumps per plant (Bhadouria, et. al., 2013). Raised beds, when managed with optimal plant density, produce higher growth performance and yield compared to traditional flat planting.

Mechanical planting methods

Animal driven planting

Figure 1: Animal drawn turmeric planter

Animal drawn turmeric planter is a low-cost agricultural implement. The planter is suitable for small and marginal farmers. The planter is pulled by the pair of bullocks. As the machine is moves forward the ground wheel rotate and transmits motion to the seed metering mechanism. The operator manually feeds turmeric rhizomes into the metering unit. The rotating disc picks up rhizomes and drops them into the furrow through the delivery tube at regular intervals and ridgers fills

the furrow with soil. The field capacity of planter is 0.03 ha/h.

Tractor driven semi-automatic planting

Agricultural mechanization has advanced significantly, with most farm operation depends on tractor operated equipment. In this context, several tractors operated semi-automatic turmeric planters have been developed to reduce the labour requirement, improving the planting efficiency and precision. The operation of planter required both mechanical and human power. The planter required human operator, mainly for feeding the turmeric rhizome into metering disc. The planter consists of seed hopper, main frame, ground wheel, seed metering mechanism, ridger, furrow opener, operator seat and power transmission unit. As the planter moves forward the ground wheel transmit motion to the metering disc. The operator continuously feeds the turmeric rhizome into the rotating metering disc. Then the rhizome passes through the rhizome dropping tube and drops between the ridgers. Then ridgers are covers rhizome with soil.

A tractor operated semi-automatic two row turmeric planters was developed at Rajendra Prasad Central Agricultural university Bihar. The planter is capable of planting two rows. The metering disc of planter consists 10 slots and two operators are required to feed the rhizome into metering disc. The planter maintains 45 cm row to row spacing and 20 cm rhizomes spacing. The field efficiency ranges from 0.059 ha/h to 0.09 ha/h at different forward speed from 0.75 to 1.25 km/h.

Figure 2: Semi-automatic turmeric planter

Similarly, Dattkrupa agro engineering work, Satara developed tractor drawn turmeric planter. The planter is capable of planting 0.68 to 0.83 ha/day. Compared with traditional manual showing the planter saved 25-43% labour, 6-15% rhizome and increased crop yield by 6-16%

Four-row turmeric seed drill was developed at College of Food Science and Technology, Rudrur, Nizamabad, Telangana. The planter is capable of planting 4 rows and required four operators to feed the rhizome into metering disc. The planter maintains 45 cm row to row and 20 cm rhizomes spacing. The field capacity of 4 row turmeric seed drill is 0.189 ha/h at forward speed of 1.259 km/h. Fuel consumption of seed drill is 5 l/h.

Figure 3: Raised bed turmeric semi–automatic planter

Figure 4: 4-row turmeric seed drill

Tractor driven automatic planting

An automatic turmeric planter is an advanced planter designed for planting without human intervention. In automatic turmeric planter rhizomes are loaded into the hopper and metering mechanism pick the single rhizome and drop them into delivery tube. The furrow opener places the rhizome at uniform depth and ridgers covers the rhizome with soil. The entire operation is synchronized with the forward speed of the planter. The field efficiency of automatic turmeric planter is higher than semi-automatic turmeric planter.

Figure 5: Automatic turmeric planter

Conclusions

Mechanization in turmeric planting is essential for improving efficiency, precision, and overall

productivity in turmeric cultivation. Animal-driven planters provide some improvement by reducing drudgery and improving planting uniformity, but it cannot match the efficiency of tractor-operated planters. Semi-automatic planters offer a balance between cost and efficiency with moderate labour involvement. Fully automatic turmeric planters ensure high precision, uniform spacing, and reduced labour dependency, making them suitable for large-scale and commercial farming. Overall, mechanization of turmeric planting plays a crucial role in reduce dependency on human labour, minimising drudgery, lowering production costs, and improving crop productivity.

References

- Bhadouria, R. S., Singh, T.K., Singh, J., Haldar, A (2013). Effect of various planting methods on growth and yield of turmeric (Curcuma longa L.). Plant Arch, 13(2), 1093-1095.
- Bomble, V., (2020). Performance evaluation of tractor drawn turmeric planter. International journal of innovative trends in engineering, 94(70), 30-31.
- Gill, B. S., Simerjit Kaur, S. K., & Saini, S. S. (2004). Influence of planting methods, spacing and farmyard manure on growth, yield and nutrient content of turmeric (Curcuma longa L.). J Spices Aromat Crops, 13(2), 117-120.
- Jayashree, E., Kandiannan, K., Prasath, D., & Rashid, P. (2016). Ginger (extension pamphlet). Indian Institute of Spices Research.
- Kambale, G. V., Munde, D. P. A., & Solanki, D. S. N., (2023). Performance and evaluation of VNMKV, UAE developed bullock drawn turmeric planter. The Pharma Innovation Journal, 12(1), 131-136.
- Kumar, E. M., & Bariha, A., (2023). Development of tractor operated semi-automatic two row turmeric planter. The Pharma Innovation Journal, 12(2), 1057-1060.
- Mathanker, S. K., & Mathew, M. (2002). Metering mechanisms for ginger planter. Agric. Eng. J, 11(1), 31-39.
- Raju, K. V. V. R., Kumar, K. R., Tejavath, T. R., & Sandeep, N., (2023). Design and development of a tractor-powered turmeric rhizome planter. International Journal of Intelligent Systems and Applications in Engineering, 11(4), 991–995.
- Swamy, R., Jayaprakash, R., Sridhar, M., Kumar, S. N., & Naaiik, R. B. (2023). Performance evaluation of tractor drawn 2-row raised bed turmeric semi-automatic planter. The Pharma Innovation Journal 2023, 12(10), 1783-1786.
- Swamy, R., Jayaprakash, R., Sridhar, M., Naik, B. B., & Naveen, S. (2023). Tractor drawn turmeric planter's performance evaluation and its cost economics. The Pharma Innovation Journal 2023, 12(9), 818-822.
- Yadhukrishnan, B., Dhananchezhiyan, P., Kavitha, R., Surendrakumar, A., & Ashokkumar, G. (2025). A review on machineries used for turmeric cultivation in India. Plant Science Today.