



ROLE OF POTASSIUM AND NITROGEN ON GROWTH, YIELD AND QUALITY OF TURMERIC

Ms.P.Hemamalini¹, Mr.S.Gopalakrishnan², Ms.O.Janaki³

Student, Dept. Of. BCA, Kaamadhenu Arts and Science College, Sathyamangalam¹

Assistant Professor, Dept. Of. CA & IT, Kaamadhenu Arts and Science College, Sathyamangalam²

Student, Dept. Of. BCA, Kaamadhenu Arts and Science College, Sathyamangalam³

Abstract: The design of the trial is two factorial R.B.D with 8 treatments and three replications. The treatments comprised of four situations of potassium (K₂O@ 80,120,160 AND 200 kg/ha) and two spray schedule of N@ 2 as foliar spray schedule of Urea. Results attained in the present disquisition reveal that the maximum vegetative growth parameters like factory height (149.72 cm), number of famers per factory (3.23) and number of leaves per factory (18.40) were recorded with the operation of potassium and nitrogen i.e, K₂O@ 200 kg/ha N@ 2 double spray as compared with sole effect of both the nutrients. Yield and yield attributing characters were also plant to be told much with the operation of K₂O@ 200 kg/ha N@ 2 double spray indicated better rhizome product through enhancement of length and weight as also secondary rhizome product per clump. The operation of K₂O@ 200 kg/ha N@ 2 double spray recorded significant on the yield per hectare (36.82 t/ha). The sole operation of potassium and nitrogen also showed significant variation with respect to yield per hectare. A progressive increase with the oleoresin content of turmeric is recorded with the adding boluses of potassium and the number of sparys of nitrogen. Still, the loftiest oleoresin content also impact significantly with sole operation of potassium and nitrogen. The operation of K₂O@ 160 kg/ha N@ 2 single spray recorded advanced curcumin content (6.19) of turmeric as compared to double spray of N.

Keywords : Turmeric, Curcuma Longa, Potassium and Nitrogen.

INTRODUCTION

We known as Turmeric is the 'Golden Spice' as well as 'Spice of Life'. Turmeric is one of the most important ancient medicinal spice, held sacred and traditionally ubiquitous. Turmeric (*Curcuma longa* Zingiberaceae) is utilized in religious rites as well as a spice, dye, medicine and cosmetic. India is the world's biggest producer and exporter of turmeric. Andhra Pradesh, Tamil Nadu, Orissa, Karnataka, West Bengal, Gujarat, Meghalaya, Maharashtra and Assam are some of the major states that cultivate turmeric, with Andhra Pradesh alone accounting for 35.0 percent of the area and 47.0 percent of the production.

In India's southwestern region, turmeric (*Curcuma longa* L.) is one of the most extensively produced spice crops. It is a versatile and profitable cash crop, with the cured dried rhizome as its main product. Turmeric has a variety of uses, including as an orange coloring power in the textile business, as well as in the food sector and for medicinal purposes. Its scent, flavor and oleoresin content are also valued. Turmeric is well recognized in every Indian meal (Kitchen).

Turmeric has emerged as one of the most important cash crop with a high economic return, particularly for farmers with little resources in India. The crop has been commercialized on a big private farm. Turmeric is a nutrient-depleted crop, notably in terms of nitrogen. Due to its shallow roots, long development time (up to 9 months), and ability to generate significant volumes of dry matter per unit area, turmeric nutrient uptake is also affected by the stage of development (moderate vegetative growth, vigorous vegetative growth, slow vegetative growth and senescence).

The demand of turmeric increased each over the world as new constituents of remedial and life saving parcels were discovered. Turmeric is major spice in which maximum number of products has been patented. turmeric is a heavy confluent of N and K nutrients and K uptake is comparatively advanced than N. According to saifudeen(1981), the uptake of nutrients increased with the increase in dry matter product and generally the phase of active vegetative growth is the period during which there's maximum uptake of nutrients. Further, it is apparent from studies conducted by Rao and Rao (1988) that the uptake of nutrients is advanced up to third month for potassium, up to fourth month for nitrogen and up to fifth month for phosphorous indicating the need for earlier operation of N, P and K diseases for perfecting the factory growth. Especially N and K are two important diseases for boosting growth and yield of turmeric.



Banafer et al.,(1995) and Sugtto et al.,(1995) detailed that with the expansion in K levels development, leaves number, turners number and rhizome yield expanded. Also, Pauer et al.,(1992) and Pandey (1992) expressed that rising paces of N fundamentally advanced the yield and other yield contributing characters of turmeric. The information on the healthful prerequisites is small especially K and N of this yield particularly in the fields of India.

MATERIAL AND METHODS

The examination station is arranged at 23.50 N scope and 890 E longitude with a typical elevation of 9.75 m above mean ocean level. The dirt of the trial site is average Gangetic Alluvial soil (Inceptisols) having sandy topsoil surface, very much depleted with medium richness status. The climatic state of the trial site is sub-sticky. The plan of the investigation is two variables factorial RBD with 8 medicines. There were 4 degree of K (80,120,160,180 kg/ha) and two splash timetable of nitrogen (first shower @ 90 days and second shower @ 90 and 120 days subsequent to planting) reproduced threefold. A plot size of 1.5 * 1.5 m is utilized with dispersing of 25 * 30 cm.FYM @20 t/ha is applied at the hour of land readiness and N and P @ 60:50 and four degrees of K₂O for example 80, 120, 160, and 200 kg/ha were additionally applied. Full portion of P₂O₅ and half portion of K₂O were applied as basal at season of planting. Half suggested portion of N was applied 45 days subsequent to planting (DAP). The leftover portions of N and K₂O were applied 90 DAP and earthing up was done after top dressing. All vital intercultural tasks were done on a case by case basis by the investigation. The information gathered from the field were exposed to factual investigation to the two variables factorial R.B.D. by following method spread out by Gomez and Gomez,(1984).

RESULTS AND DISCUSSION EFFECT OF NITROGEN

The impact of N on development , endlessly yield credits of turmeric are introduced in table 1. It is uncovered that plant level, number of turners per plant, number of leaves per plant, leaf length and leaf width, number of mother rhizome, number of essential finger, number of auxiliary finger and projected yield per hectare were affected by N application . It was clear that N @ 2% twofold shower recorded greatest plant (146.36 cm), number of leaves per plant (14.88), leaf length(71.95 cm), leaf width (16.21 cm), number of mother rhizome per bunch (2.09), number of essential finger (7.87), number of optional finger (19.65) and projected yield (32.84 t/ha), oleoresin content (9.18%). Anyway most noteworthy curcumin content of (5.79) was recorded when N @ 2% single shower was applied.

The sole impact of potassium and nitrogen as foliar shower 2%N as urea and their cooperation affected plant level of turmeric plant.The expanded in development credits of turmeric with expansion in N application might be made sense of in the way that nitrogen being dynamic constituent of cellular material chemical and chlorophyll, assumes a part of reactant specialist in physiological cycles, speed up cell division and accelerate the photograph osmosis which thus support the plant development and further develop the plant structures.

The present finding announced in this paper concurs with different examiners chipping away at turmeric. Curcumin content was impacted much because of single shower (5.79%) of nitrogen while twofold splash showed a decrease (5.23%) in this regard. The communication impact didn't showed any reliable variety as to curcumin content of turmeric.

EFFECT OF POTASSIUM

It's observed that K and had significant effect on the growth, yield character, yield and quality of turmeric. It's apparent that with the increase of K₂O a situations, growth parameter like factory height, number of leaves per factory and splint length of turmeric, projected yield per hectare and oleoresin content increased precipitously. All the yield parameters increased contemporaneously with the increase of K up to 200kg/ha among the four situations of potassium (80,120,160 and 200 kg/ha), the loftiest factory height (147.53 cm), number of leaves per factory (16.50), number of farmers per factory (3.19), splint length (75.32 cm), number of mama rhizome (2.66), number of primary cutlet (8.50), number of secondary cutlet(20.48), projected yield per hectare (35.99 t/ha) and oleoresin content (9.94) was recorded with K₂O@ 200 kg/ha. Still the maximum Curcuma content was recorded with the treatment K₂O@ 160 kg/ha (6.380).

Reported that with The increase in K situations growth, number of leaves, cultivator figures and rhizome yield increased which corroborates the findings of the present disquisition that high potassium nutrition told number of splint and cultivator product which an agreement. Showed that adding rates of potassium operation had a positive and significant effect on fresh rhizome yield. They noted that with the increase of K situation, yield contributing characters of turmeric increased precipitously. They further observed that the effect of K on turmeric was plant more distinct than nitrogen. All the yield parameters increased contemporaneously with the increase of K up to 200 kg K₂O/ ha. Among 4 K degree (80,120,160 and 200 kg K₂O/ha, 200 kg K₂O / ha used to be high-quality with appreciate to the perfect quantity of mom rhizome, wide variety of essential finger, wide variety of secondary finger and best possible turmeric yield (35.99 t/ ha) was once recorded with K stage (200 kg K₂O/ha). The very best oleoresin content material of 9.94% used to be bought with K₂O@ 200 kg/ha.

**Table 1:** Effect of Potassium, Nitrogen and their commerce on factory, splint length, splint range, no of mama rhizome, no of primary fitters, no of secondary fitters, projected yield/ ha, oleoresin and curcumin

Treatment	2003-04				2004-05			
	Plant emergence* (%)	Plant height (cm)	Tillers plant ⁻¹	Leaf area index	Plant emergence (%)	Plant height (cm)	Tillers plant ⁻¹	Leaf area index
Planting method								
Flat	88.1	46.0	2.4	3.7	86.4	42.6	2.7	3.0
Ridge	80.0	43.3	2.3	3.6	74.3	43.5	2.8	3.1
SEM \pm	1.45	0.75	0.08	0.12	1.65	1.24	0.07	0.11
CD (P=0.05)	4.1	2.1	NS	NS	4.7	NS	NS	NS
Plant density (plants ha⁻¹)								
1,66,667	80.7	48.4	2.3	4.2	77.8	47.1	2.6	4.2
1,11,111	85.9	44.5	2.3	3.2	80.3	42.1	2.8	2.7
83,333	84.1	40.9	2.4	2.4	77.6	39.9	2.8	2.2
SEM \pm	1.77	0.92	0.09	0.14	2.02	1.52	0.09	0.14
CD (P=0.05)	NS	2.6	NS	0.4	NS	4.3	NS	0.4
Planting material								
Mother rhizome	86.6	49.6	2.7	4.4	83.1	50.0	3.1	3.8
Primary finger	81.3	43.9	2.3	3.6	80.3	43.4	2.7	3.2
Secondary finger	82.9	40.4	2.1	2.9	78.0	36.0	2.4	2.2
SEM \pm	1.77	0.92	0.09	0.14	2.02	1.52	0.09	0.14
CD (P=0.05)	NS	2.6	0.3	0.4	NS	4.3	0.3	0.4

POTASSIUM AND NITROGEN INTERACTION

That the evident has been shown from the table 1 that both N and K had positive impact on turmeric production. All the growth character and yield influenced significantly with the increasing level of Potassium and nitrogen. The plant height was found significantly increased with the increasing level of potassium and foliar spray nitrogen twice, the tallest plant (149.72 cm). It was obtained from the treatment NS₂K₄ (K₂O @ 200 kg/ha + N @ 2% double spray). The number of tillers, leaves and girth of plant were also varied significantly among the different levels of potassium. Plants received with K₂O @ 200kg/ha + N @ 2% double spray recorded the maximum number of mother rhizomes (2.89), number of primary fingers (8.60), number of secondary fingers (21.04). The highest yield of 36.82 t/ha and the highest oleoresin content (10.50%). It was also recorded with K₂O @ 200kg/ha + N @ 2% double spray however the highest curcumin content (5.98%) was recorded with K₂O @ 160kg/ha + N @ 2% double spray. Potassium along with the nitrogen and phosphorous plays a major role in growth and yield as well as it involved in assimilation, transport and storage tissue development (Tisdale et al., 1985).

The interaction effect did not showed any consistent variation with regard to curcumin content of turmeric. The curcumin accumulation is increased and the nutrients has increased as (potassium and nitrogen) upto the certain level but more it is increased with the level of nutrients and it could not increased further in the content of curcumin. Higher levels of N, P and K fertilization have also been reported to the decreasing of curcumin content of rhizomes (Rao et al., 1975), which supports the present findings where the curcumin content was found to decrease at the highest dose of potassium and spraying of nitrogen as the urea twice. Reports are done by various workers also it is suggested that at higher fertility status of soil, there might be some depression in the curcumin content of rhizome (Rao and Reddy, 1978 and Swamy, 1984). The largest curcumin content of 6.79 % was obtained with the treatment NS₁K₃ (K₂O @ 160kg/ha + N @ 2% single spray) indicating that this combination is best for promoting curcumin content of turmeric. Curcumin concentration of rhizome is a fair indicator as the quality of turmeric.



CONCLUSION

It is concluded from the two years data that the application of K_2O @ 200kg/ha + N @ 2% double spray proved the most effective and it is influenced by different growth parameters, yield and yield component as also quality constituent in the turmeric cv. Suranjana is under the alluvial soil of West Bengal.

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