Himachal Journal of Agricultural Research Vol. 32(2) : 134-136, 2006

Short Note

Effect of multinutrient on yield and quality of turmeric (*Curcuma longa* L.) grown in acidic soil of Himachal Pradesh

S. P. Dixit and S. K. Bhardwaj
Department of Soil Science
CSK Himachal Pradesh Krishi Vishvavidayalaya, Palampur-176 062.

Turmeric has many medicinal values in managing diseases of stomach, leprosy, fever and discharge from ear, ulcer, liver disorders, wounds, burns and blood purifier. This crop in Indian Sub-continent accounts for 90 percent of the total world production. In Himachal Pradesh, it is gaining popularity due to good monetary returns and high market demand and is liked by the farmers.

Acid lands in Himachal Pradesh are characterized by features like fragility, inaccessibility and marginality and constitute about 1777.35 thousand hectares area (Sharma *et al.*, 2006)). Nitrogen, phosphorus, potassium, sulphur and magnesium are the principal plant nutrients and play an important role in turmeric nutrition and improving its quality (Sharma *et al.* , 2001). These nutrients are deficient in acid soils (Tiwari, 2002) and their use in turmeric crop is meager. Little work has been done on acid soils.

For studying the effect of multinutrient on turmeric (*Curcuma longa* L.) an experiment was conducted at the experimental farm of CSK HPKV, Palampur for three years (2001 to 2003) on an acidic silty clay loam , Typic hapludalf soil. The soil had pH 5.7 and contained 9.2 g organic carbon /kg of soil. The status of available N, P, K, S and exchangeable Mg was 238, 14.1 , 198, 19.8 kg/ha and 1.21 cmol(p+)/ kg soil, respectively. The dose of 100% N, P_2O_5, K_2O, S and Mg for turmeric crop were 30, 30, 60, 30 and 15 kg/ha, respectively. The crop was sown in last week of May during all the three years. The crop was harvested between 20th November to 26th during all the years. Row to row and plant to plant distance was 30 and 20 cm, respectively. The doses of 100% N,P_2O_5, K_2O, S and Mg for the crop were 30,30,60,60 and 15 kg/ha, respectively. Treatments included absolute control, control (FYM@15tonnes/ha), 100% N, 100% NP, 100% NPK, 100% NPKS, 100% NPKSMg, 125% N, 125% NP, 125% NPK, 125% NPKS, 125% NPKSMg, 150% N, 150% NP, 150% NPK, 150%NPKS, 150% NPKSMg consisting of three replications. Curcumin content was determined by the procedure given by Manjunath *et al.* (1991).

The cumulative data (Table 1) of two revealed that application of multinutrients and FYM significantly increased the rhizome yield of turmeric over absolute control. An increase in rhizome yield due to FYM was 27 per cent over absolute control . The effect of 100 % N over control (FYM alone), 100% NP over 100% N, 100% NPK over 100% NP, 100% NPKS over 100% NPK was significant in increasing the turmeric rhizome yield and the respective increase was 31, 27, 21 and 10 per cent . However, 100% NPKSMg did not increased its yield significantly over 100% NPKS. At 125 and 150% level of nutrients, the response was similar as at 100% nutrients level, except that 125% NPKSMg was also significant over 125% NPKS. The maximum rhizome yield of turmeric (151 q/ha) was recorded in 150% NPKSMg as compared to absolute control (without FYM), where it was only 47.4 q/ha. In addition to this 125% NPKS increased its yield significantly over 100% NPKS, but 150% NPKS was not significant over 100% NPKS, which indicates that we should restrict the dose of NPKS upto 125% of the recommended in the crop .Contrary to this, when NPK alone was applied from 100 to 150% level , there was significant improvement in its yield, indicating that when only NPK are applied then still there is scope for increasing the yield by enhancing the dose of NPK upto 150% of the recommended level in present conditions.

The significant increase in turmeric yield may be attributed to the fact that the five major nutrients must have played their role very systematically being essential nutrients. Moreover, status of these nutrients in the present soil was low to medium, therefore

response of crop to these nutrients is self explanatory. Such results has also been reported by Methi and Bora (1993) and Singh *et al*. (1998). The improvement in productivity of the crop due to FYM may be due to supply of nutrients directly and indirectly by improving the physical and microbiological conditions in the soil (Sharma *et al.*, 2001)

The data embodied in table 1 indicates that during first year, highest curcumin content was recorded at 150%NPKSMg (3.33%), which was statistically same with 150% NPKS (3.19%) ,125%NPKSMg (3.26%) and 125%NPKS(3.16%), but was significantly better than 100% NPKS(3.10%). FYM application @ 15tonnes/ha did not improve the curcumin content significantly over absolute control. The curcumin content in 100% level of N, NP, NPK, NPKS and NPKSMg application was 3, 11, 10, 15 and 17 per cent higher than FYM application alone. The effect of N over FYM, P over N, K over NP, S over NPK and Mg over NPKS on curcumin concentration was not significant at 100, 125 and 150% level, with an exception that the NP was significant over N at 125 and 150% level.

Such a favorable effect of different nutrients on curcumin content of turmeric has also been reported by Gupta *et al.* (1990) and Baghla (2001).

It can be concluded that there was response of multinutrient on yield as well as quality of turmeric crop in acidic soils of Himachal Pradesh.

Table 1. Effect of multinutrient on rhizome yield and curcumin content in turmeric crop

Treatment	Rhizome yield (q/ha)	Curcumin (%)
Absolute control	47.4	2.57
Control	60.2	2.71
100% N	79.0	2.80
100% NP	100.7	2.93
100% NPK	121.9	3.09
100% NPKS	134.7	3.10
100% NPKSMg	139.6	3.18
125%N	93.6	2.39
125%NP	112.9	2.91
125% NPK	131.1	3.10
125% NPKS	142.5	3.16
125% NPKSMg	147.8	3.26
150%N	94.4	2.75
150%NP	117.2	2.96
150%NPK	138.5	3.06
150% NPKS	146.5	3.19
150% NPKSMg	151.0	3.33
CD (P= 0.05)	5.0	0.20

VIR SOFTECH

References

Baghla, K. 2001. Studies on integrated nutrient management system for turmeric-garlic cropping sequene in mountain acid soils. *M.Sc. Thesis*, CSK HPKV, Palampur.

Gupta, C. R. , Singh, P. N. and Singh, V. K. 1990. Note on response of turmeric (*Curcuma longa* L.) to phosphorus in acidic soils. *Vegetable Science* 17 (2):198-200.

Manjunath, M. N. , Sattigeri, V. D. and Nagaraja K. V. 1991. Curcumin in turmeric. Spices in India, March , 7-9.

Medhi, G. and Bora, P. 1993. Effect of nitrogen and spacing on growth and yield of turmeric . Haryana *Journal of Hortcultural Science* 22 (3): 253-55.

Sharma, S. P., Bhardwaj, S. K., Plaha, P., Subehia, S. K., Jain, P. and Verma, T. S. 2006. *Technical Bulletin on Acid soils of Himachal Pradesh and their management,* Department of Soil Science, CSK HPKV, Palampur.

Sharma, P. K. , Baghla, K., Dixit, S. P. and Bhardwaj, S. K. 2001. Preliminary studies on potassium in turmeric as influenced by farm yard manure in mountain acidic lands of Western Himalayas, India. *In*: Proceedings of International Symposium on Importance of Potassium in nutrient management of sustainable crop production in India pp 325-328.

Singh, V. B., Singh, N. P. and Swer, B. 1998. Effect of potassium and nitrogen on yield and quality of turmeric (*Curcuma longa* L.). *Journal of Potassium Research* 15 (1-4): 88-92.

Tiwari, K. N. 2002. Nutrient management for sustainable agriculture. *Journal of Indian Society of Soil Science* 50 (4):374-97.

VIR SOFTECH