RESEARCH PAPER International Journal of Agricultural Sciences, Vol. 5 Issue 1, January to May, 2009 : 142-144

# Effect of bioregulants on quality of turmeric (*Curcuma longa* L.) cv. BSR 2

G. SATHISH* AND P. PARAMAGURU [1]
Department of Spices and Plantation Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA

## ABSTRACT

**The effect of bioregulants on quality of turmeric (*Curcuma longa* L.) was studied. The experiment was laid out in Randomized Block Design consisting of four biorcgulants *viz.*, Panchakavya, Vermiwash, Humic acid and Effective microorganism, and of recommended dose of fertilizer with 13 treatments. The treatment, foliar application of 0.05% humic acid favourably increased the curcumin (4.58% per cent), oleoresin content (9.47 per cent) essential oil content (4.94 per cent) and chlorophyll content (1.83 mg $g^{-1}$).**

**Key words :** Bioregulants, Turmeric, Quality.

## INTRODUCTION

Turmeric (*Curcuma longa* L.) is an important spice as well as medicinal plant belonged to the family Zingiberaceae. Turmeric carries a wide range of medicinal values such as a stomachic, blood purifier, antiseptic, useful in dropsy, purulent ophthalmia, wound healing and for inflammation. Turmeric being an exhaustive crop. requires heavy manuring. But the use of chemical fertilizer escalate the production cost and causes health and environmental hazards. On the other hands organic farming is an important and ecofriendly method of cultivation, showing promising effect on growth and yield of various crops. Therefore, it is essential to formulate an alternative cultivation strategy for high value crops like turmeric.

The present study deals with the results of the experiments on the effect of bioregulants on quality of turmeric.

## MATERIALS AND METHODS

A field experiment was conducted at Department of Spices and Plantation Crops, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu during the year 2005-2006. The treatments were replicated thrice in Randomized Block Design. The experimented field soil is a sandy loam with EC 0.42 d s $m^{-1}$, pH 7.0, available nitrogen 101 kg/ha, available phosphorus 5.6 kg/ha and available potassium 380 kg/ha. The experiment consisted thirteen treatments *viz*, foliar spray with Panchakavya 2% ($T_1$), Panchakavya 3% ($T_2$), Panchakavya 4% ($T_3$), vermiwash 10 % ($T_4$), vermiwash 20% ($T_5$), humic acid 0.05 % ($T_6$), humic acid 0.1% ($T_7$) humic acid 0.15% ($T_8$), extended Effective microorganism 1% ($T_9$) extended Effective microorganism 2% ($T_{10}$), extended Effective microorganism 3% ($T_{11}$), 100 per cent recommended dose of NPK fertilizers ($T_{12}$) and control ($T_{13}$). The treatments were imposed from 30 days after planting. Observations on curcumin content, oleoresin content, essential oil content, chlorophyll were recorded from randomly selected plants and are presented in the Table 1.

## RESULTS AND DISCUSSION

Quality parameters like curcumin, essential oil and oleoresin contents showed significant difference among the treatments .The result showed the significant effects for all the characters studied. Characters such as curcumin content, oleoresin content, essential oil content, chlorophyll were significantly influenced by the foliar application of 0.05 per cent humic acid ($T_6$) in the Table 1.

The curcumin content of different treatment showed that there was significant difference in the curcumin content due to the application of bioregulants. The highest curcumin content was recorded (4.57 %) in the treatment $T_6$ (humic acid 0.05 per cednt foliar sprays). Application of $T_2$ (panchkavya 3 per cent foliar spray) showed 4.36 per cent increase in curcumin content over control. The lowest value was recorded by $T_{13}$ (control) with a curcumin content of 2.21 per cent (Table 1). The main reason for the availability of more quantity or nitrogen in the form of $NH_4$-N, which could have promoted the hormonal activity of plants. This would have increased the curcumin content of rhizomes. This is in contim1ution with earlier findings of Reddy and Rao (1978). The highest oleoresin content recorded was 9.47% in the treatment $T_6$ (humic acid 0.05% foliar spray) while it was the followed by $T_2$

*** Author for correspondence.** [1] Department of Horticulture, Horticultural College and Research Institute, Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA

**Table 1 : Effect of bioregulants on quality of turmeric CV. BSR2**

| Treatments | Curcumin % | Oleoresin % | Essential oil % | Total chlorophyll (180 DAP) |
|---|---|---|---|---|
| $T_1$ | 3.845 | 8.12 | 3.71 | 1.654 |
| $T_2$ | 4.367 | 8.99 | 4.77 | 1.802 |
| T | 3.907 | 8.71 | 3.59 | 1.595 |
| $T_4$ | 4.205 | 8.52 | 3.48 | 1.705 |
| $T_5$ | 3.756 | 8.64 | 3.58 | 1.610 |
| $T_6$ | 4.577 | 9.47 | 4.94 | 1.838 |
| $T_7$ | 3.497 | 8.29 | 3.68 | 1.668 |
| $T_8$ | 4.072 | 8.55 | 3.48 | 1.698 |
| $T_9$ | 3.703 | 8.36 | 3.65 | 1.739 |
| $T_{10}$ | 3.900 | 8.63 | 3.82 | 1.576 |
| $T_{11}$ | 3.948 | 8.01 | 3.62 | 1.723 |
| $T_{12}$ | 3.015 | 7.76 | 3.01 | 1.503 |
| $T_{13}$ | 2.215 | 6.25 | 2.11 | 1.433 |
| Mean | 3.7733 | 8.3390 | 3.6103 | 1.6569 |
| S.E. $\pm$ | 0.0640 | 0.0794 | 0.0661 | 0.0121 |
| C.D. (P=0.05) | 0.1321 | 0.1639 | 0.1364 | 0.0250 |

(panchakavya 3% foliar spray) with the value of 8.99 %. The lowest value was recorded by $T_{13}$ (control) with an oleoresin content of 6.25 %. Foliar spraying of 0.05% humic acid helped the plant nutrients through its own decomposition and slow release of nutrients might have increased the nutrient uptake by the rhizomes. Usually humic acid with a narrow CN ratio produced more chelating molecules which favours availability of phosphate. This easily available form might have triggered the oleoresin content of rhizomes. The present findings are in confirmation with earlier works of Mohan Babu (1981); Rathinavel (1983) who opined that greater uptake of nutrients increased the oleoresin contents of rhizomes.

The essential oil content of the rhizomes had been increased significantly by the application of bioregulants when compared to control. The highest increase was recorded in $T_6$ (4.94%) obtained by application of humic acid 0.05% foliar spray followed by $T_2$ (panchakavya 3% foliar spray) with the value of 4.77%. The lowest value was recorded $T_{13}$ by an essential oil content of 2.11 %. In contrast to the above treatment the higher essential oil content was recorded by the foliar application of 0.05% humic acid (Table 1). The possible reason could be that earthworm casts stimulate nitrase reductase activity in plants. This enzyme regulates nitrogen availability to plants. Improved nitrogen metabolism particularly through nitrase reductase activity might have exerted higher essential oil content in rhizomes. The present findings are in confirmation with earlier findings of Vadiraj *et al.* (1998), Maheswarappa *et al.* (2000) in galangal, Mridhula and Jayachandran (2001) in turmeric. The total chlorophyll was gradually increased from 90 days after planting to 180 days after planting and declined at 225 days after planting. Application of bioregulants significantly increased the total chlorophyll content present in the plant at 180$^{th}$ day after planting. Among the treatments the treatment $T_6$ (humic acid 0.05% foliar spray) registered high chlorophyll content at 180 days after planting of 1.838 mg $g^{-1}$) followed by $T_2$ (panchkavya 3% foliar spray) with the value of 1.802 mg $g^{-1}$ at 180 days after planting. The treatment control ($T_{13}$) showed lower total chlorophyll with the value of 1.433 mg $g^{-1}$. Trend of decreasing in total chlorophyll as the days are on 180$^{th}$ day after planting. In this study on turmeric foliar spraying of 0.05 per cent humic acid recorded the highest chlorophyll content. Experiments of Sladky (1959) showed 63 percentage increases in chlorophyll content of tomato due to humic acid application. Ping *et al.* (2001) got similar results in *Brassica*. The increase in chlorophyll content can be better explained by the increased intake of iron by tomato grown in the presence of humic suhstances (Guminski *et al.*, 1965).

## REFERENCES

**Guminski, S., Guminska, Z. and Sulej, J. (1965).** Effects of humate agar-agar and EDTA on the development of tomato seedlings in aerated and non-aerated water cultures. *J Exp. Bot.*, **16**: 151-162.

**Maheswarappa, H.P., Nanjappa, H.V. and Hedge , M.R. (2000).** Dry matter production and accumulation in different parts of galangal *(Kaempferia galanga* L.). *Indian J Agron.*, **45**(4): 698-706.

**Mohanbabu, N. (1981).** Studies on the influence of potassium on growth, yield and quality of turmeric *(Curcuma longa* L.). M.Sc. (Ag.) Thesis, Tamil Nadu Agricultural University, Coimbatore.

**Mridula, K.R. and Jayachandran, B.K. (2000).** Major nutrient requirement of mango ginger (*Curcuma amada). J. Spices and Aromatic Crops*, **8**(1): 85-88.

**Ping, P., Xue, S., Xin, M. and Zhao, H. (2001).** A study of the effect of humic acid compound fertilizer on the quality and physiological index of Brassica. *J. Hebei agric. University,* **24**(1): 24-27.

**Rathinavel, M. (1983).** Effect of potassium application and time of harvest on growth, yield and quality of turmeric (*Curcuma longa* L.). M.Sc.(Hort.) Thesis, Tamil Nadu Agricultural University, Coimbatore (T.N.).

**Reddy, R.V.K. and Rao, R.M. (1978).** Effect of N, P and K fertilization on curing percentage and curcumin content of turmeric (*Curcuma longa* L.). *Indian J. Hort.*, **35**: 143-144.

**Sladky, Z. (1959).** The effect of extracted humic substances on growth of tomato plants. *Biol. Plantarum*, **1**(2): 142-150.

**Vadiraj, B.A., Siddagangaiah and Narayana Poti (1998).** Effect of vermicompost on the growth and yield of turmeric. *South. Indian Hort.*, **46** (6): 176-179.

*Received : August, 2007; Accepted : October, 2008*