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Effect of Different Micronutrients Sprays at different Concentrations on Biochemical Parameters and vase life of rose cv. Sophia Loren.

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ABSTRACT: *An experiment was conducted to study the effect of pre-harvest foliar spray of different micronutrients viz MgSO4 (0.5, 1.0 and 1.5%), MnSO4 (0.5, 1.0 and 1.5%), FeSO4 (1.0, 1.5 and 2.0 %), Boric acid (0.25, 0.5 and 0.75%) ZnSO4 (0.5, 0.75 and 1.0%) and CuSO4 (0.1, 0.3 and 0.5%) on certain biochemical parameters and vase life of rose cv. Sophia Loren. The results revealed that all the boric acid spray treatments (boric acid 0.5, 0.25 and 0.75%) recorded (9.56, 9.31 and 9.24) higher vase life in days respectively. Which may be attributed to the highest sugar content (6.083, 4.31 and 4.017 mg/gfw) recorded respectively in these treatments. It is followed by ZnSO4 0.75% which recorded a vase life of 9.11 days with sugar content of 5.89 mg/ gfw. CuSO4 0.1% recorded a vase life of 8.86 days. Lower total free amino acids (TFAA) 9.97 mg/gdw may the reason attributed for longer vase life of flowers in Boric acid 0.5% spray treatment.*

Key words: *micronutrients, rose, total sugars, total free amino acids, boric acid, anthocynin content, vase life*

Rose (*Rosa indica* L.) is one of the natures beautiful creations and is universally acclaimed as the Queen of Flowers, belongs to family Rosaceae. This is the symbol of love, adoration, innocence and other virtues. It is certainly the best known and most popular of all garden flowers throughout the world and has been growing on this earth for many million years before man himself appeared (Fair brother 1965, Gault and Synge 1971).

The importance of nutrition in obtaining flowers for a longer period in rose is well known (Mukhopadhyay *et al*., 1980). Rose is a perennial and has gross feeder roots, requires a balanced dose of nutrients after pruning for better quality flower production (Maharana and pradhan, 1977). The yield and quality of rose is governed by balanced use of macro and micro nutrients. There is ever increasing demand for cut flowers both in domestic and international market. Therefore the primitive field growing needs a focus to improve package practices for getting higher flower yields with good quality and vase life characters. The available Information on the response of rose to various micronutrient sprays and their level of concentration in improving Biochemical parameters and vase life is very meager hence keeping in view the importance of the effect of micronutrients Biochemical parameters which in turn having influence on vase life, present investigation was carried out.

METHODS AND MATERIALS

The experiment was conducted during the period 2005-06 at college of Agriculture, Rajendra nagar, Hyderabad. The treatments consists of three levels of each micronutrients viz MgSO4 (0.5, 1.0 and 1.5%), MnSO4 (0.5, 1.0 and 1.5%), FeSO4 (1.0, 1.5 and 2.0%), Boric acid (0.25, 0.5 and 0.75%) ZnSO4 (0.5, 0.75 and 1.0%) and CuSO4 (0.1, 0.3 and 0.5%). The micronutrients used were of AR grade. Foliar application of these micronutrient solutions was carried out at new flush emerging stage i.e one month after pruning. The experiment was laid out in randomized block design with three replications. Control plot is maintained with distilled water spray.

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The rose crop cv. Sophia Loren was planted with a spacing of 60 X 60 cm and 2 year old garden was selected for conducting the experiment. All the cultural practices weeding, field sanitation, irrigations, need based plant protection measures were attended.

Observations on Biochemical parameters (Total sugrs, reducing sugars, Non-reducing sugars, Total free amino acids and Anthocyanin content) were recorded and Vase life in days was recorded. The experimental data were analyzed statistically by the technique of analysis of variance (ANOVA) as applicable to Randomized Block design suggested by Panse and Sukhatme,1985 using a computerized package to find the significance levels of each of the parameter.a computerized package to find the significance levels of each of the parameter.

RESULTS AND DISCUSSIONS

Biochemical Parameters

Reducing Sugars in flower petals of Rose cv. Sophia Loren was significantly influenced by different micronutrient sprays (Table 1). Among the concentrations of micronutrients MgSO4 at 0.5 per cent (2.85%), MnSO4 at 0.5 per cent (6.49%), FeSO4 at 2.0 per cent (24.56%), Boric acid at 0.75per cent (75.67%), ZnSO4 at 1.0 per cent (63.2%) higher reducing sugars and CuSO4 at 0.3 per cent (12.44%) recorded lower reducing sugars over control. Among the different micronutrients maximum reducing sugar content was recorded in Boric acid at 0.75% (4.49 mg/gfw) followed by ZnSO4 at 1.0% (4.17 mg/gfw). Minimum content of reducing sugars was recorded in $MnSO_4$ 1.5% (T6) (1.75 mg/gfw). (Table 1)

Non-reducing Sugars in floer petals of Rose cv. Sophia Loren was significantly influenced by different micronutrient sprays (Table 1). Among the concentrations of micronutrients $MgSO_4$ at 1.0 per cent (5.84%), MnSO4 at 0.5 per cent (11.29%), FeSO4 at 2.0 per cent (23.46%), Boric acid at 0.75per cent (77.26%) ZnSO4 at 1.0 per cent (82.63%) recorded higher reducing sugars over control and these are significantly superior over other two concentrations of respective nutrients and while CuSO4 at 0.5 per cent (10.57%) recorded lower reducing sugars over control and two concentrations of CuSO4. Among the different micronutrients maximum non reducing sugar content was recorded with Boric acid at 0.75% recorded (2.21 mg/gfw) followed by ZnSO4 at 1.0% (2.28mg/gfw) which were on par with each other and significantly superior over control. MnSO4 1.5% (T6)

Table 1
Effect of micronutrients sprayed at different concentrations on biochemical parameters of Rose cv. Sophia Loren.

Tr No.	*Treatments*	*Total sugars (mg/gfw)*	*Reducing sugars (mg/gfw)*	*Non reducing sugars mg/gfw)*	*Total free amino acids (mg/gdw)*	*Anthocyanin (mg/gfw)*
T_1	$MgSO_4$ 0.5%	3.577	2.63	1.307	18.82	14.81
T_2	$MgSO_4$ 1.0%	3.516	2.557	1.322	25.82	16.34
T_3	$MgSO_4$ 1.5%	2.969	2.201	1.065	25.11	16.50
T_4	$MnSO_4$ 0.5%	3.733	2.723	1.390	18.36	12.21
T_5	$MnSO_4$ 1.0%	3.454	2.497	1.308	21.46	10.79
T_6	$MnSO_4$ 1.5%	2.379	1.752	0.868	23.16	11.88
T_7	$FeSO_4$ 1.0%	3.084	2.270	1.120	14.10	13.29
T_8	$FeSO_4$ 1.5%	2.863	2.109	1.038	10.75	14.91
T_9	$FeSO_4$ 2.0%	4.291	3.185	1.542	20.70	13.49
T_{10}	Boric acid 0.25%	4.310	3.22	1.519	12.34	13.71
T_{11}	Boric acid 0.5%	6.083	4.492	2.214	9.97	13.56
T_{12}	Boric acid 0.75%	4.017	2.966	1.456	15.32	11.02
T_{13}	$ZnSO_4$ 0.5%	3.409	2.494	1.268	16.42	9.31
T_{14}	$ZnSO_4$ 0.75%	5.886	4.173	2.281	17.60	13.78
T_{15}	$ZnSO_4$ 1.0%	4.255	3.069	1.611	20.00	13.16
T_{16}	$CuSO_4$ 0.1%	2.638	2.027	0.890	18.88	12.19
T_{17}	$CuSO_4$ 0.3%	2.687	2.043	0.931	19.41	14.28
T_{18}	$CuSO_4$ 0.5%	3.038	2.239	1.117	23.92	11.17
T_{19}	Control *	3.450	2.557	1.249	37.52	8.68
	Mean	3.665	2.695	1.341	19.46	12.44
	CD	0.053	0.124	0.053	1.39	2.022
	SEm	0.019	0.044	0.019	0.46	0.724

(0.87mg/gfw) recorded minimum content of non reducing sugars (Table 1).

Total Sugars in flower petals of of Rose cv. Sophia Loren was significantly influenced by different micronutrient sprays. Among the concentrations of micronutrients $MgSO_4$ at 0.5 per cent (3.68%) , MnSO4 at 0.5 per cent (8.26%), FeSO4 at 2.0 per cent (24.38%), Boric acid at 0.75per cent (76.32%) ZnSO4 at 1.0 per cent (24.38%) recorded significantly higher total sugar content over control and these are superior over other two concentrations of respective nutrients. Whereas CuSO4 at 0.5 per cent (11.94%) recorded lower total sugar content over control and other two concentrations of CuSO4. (Table1). Among the different micronutrients maximum content of total sugars was recorded with Boric acid 0.75% (6.08mg/gfw) followed by ZnSO4 at 1.0% (5.89 mg/gfw), while the minimum was recorded in MnSO4 1.5% (T6) (2.38 mg/gfw) (Table 4.1.4.1 a-c). Beneficial effect of boron in increasing total sugar content of flower petals might be due to the role of boron in translocation of sugars, starch and phosphorous etc and role of B in carbohydrates metabolism. (Das, 1996; Tripathi and Shukla, 2007). Singh and Bhattacharjee (1999) also observed significant increase in total sugars for flower petals of Rose cv.Raktagandha with ZnSO4 at 0.5% . (Table 1)

Anthrocyanins (mg/gfw) in flower petals of Rose cv. Sophia Loren was significantly influenced by different micronutrient sprays. Among the concentrations of micronutrients MgSO4 at 1.5 per cent (90.09%), MnSO4 at 0.5 per cent (40.67%), FeSO4 at 1.5 per cent (71.77%), Boric acid at 0.25per cent (57.95%) ZnSO4 at 0.75 per cent (58.76%) and CuSO4 at 0.3per cent (64.52%) recorded higher Anthocyanin content over control and these were superior over other two concentrations of respective nutrients. (Table 1).

Total Free Amino Acids (TFAA) in flower petals of Rose cv. Sophia Loren was significantly influenced by different micronutrient sprays. All the micronutrients at different concentrations significantly lowered TFAA content in petals as compared to control. Among the different concentrations of micronutrients MgSO4 at 0.5 per cent (49.84%), MnSO4 at 0.5 per cent (51.07%), FeSO4 at 1.5 per cent (71.35%), Boric acid at 0.5per cent (73.43%) ZnSO4 at 0.5 per cent (56.24%) and CuSO4 at 0.3per cent (49.68%) recorded lower TFAA content over control. and these concentrations are superior over other two concentrations of respective nutrients.

Among the different micronutrients Boric acid 0.5% recorded lowest TFAA (9.97 mg/gdw) followed by FeSO4 at 1.5% (10.75 mg/gdw), while control recorded highest TFAA (37.52 mg/gdw). Singh and Bhattacharjee (1999) also observed significantly lower TFAA content of flower petals of Rose cv. Rakthagandha in micronutrient treatments with FeSO4 1 or 2%.

Vase life studies

Prolonging the vase life of cut flowers involves co-ordination of two seemingly conflicting processes, the promotion of growth processes, during initial stage and retardation of metabolic processes leading to senescence, during the later stage. Enzymatic hydrolysis of cellular components, like that of proteins into amino acids and starch into sugars, is a major biochemical event associated with the senescence process of cut rose flowers. (Vidya Shankar, 2007).

The vase life of cut rose flower is often short. The cut flower wilts and floral axis bent just below the flower head which is called "bent neck". Development of such symptoms is considered to be caused by vascular occlusion, leading to reduced water uptake at later stages of flower bud opening.

Vase life in days of Rose cv. Sophia Loren was significantly influenced by different micronutrient sprays. Among the different concentrations of micronutrients MgSO4 at 0.5 per cent (106.09%), MnSO4 at 0.5 per cent (113.35%), FeSO4 at 1.0 per cent (91.10%), Boric acid at 0.5per cent (123.89%) ZnSO4 at 0.75 per cent (97.66%) and CuSO4 at 0.1 per cent (107.49%) recorded higher vase life over control and these were superior over other two concentrations of respective nutrients.

Among the different micronutrients Boric acid 0.5% (9.56) and CuSO4 at 0.1 per cent (107.49%) recorded highest vase life period and on par with each other. Lowest vase life was recorded in control (4.27). Increase in vase life of flowers in Boric acid 0.5% treatment might be attributed to the role of Boron in regulation of K/Ca ratio in plants (Das, 1996) which in turn helped in increased water uptake and reduced transpirational loss of water during vase life period, which ultimately resulted in prolonged vase life of the flowers. However Mariam-Mwangi *et al.*, (2003) observed that higher petal starch content also improves vase life. Lower TFAA content in petals was always associated with a longer vase life (Bhattacharjee and De 1998; Vidyashankar *et al.*, 2007). Lowest TFAA content in Boric acid at 0.5% could be one of the reason for highest vase life. (Table 2).

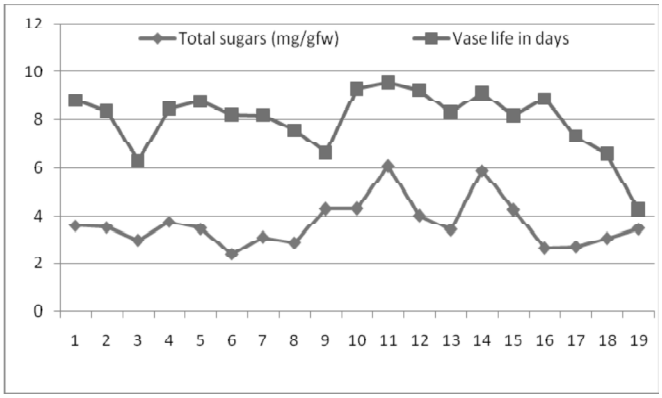

Figure 1: The relationship between Total sugars (mg/gfw) and vase life

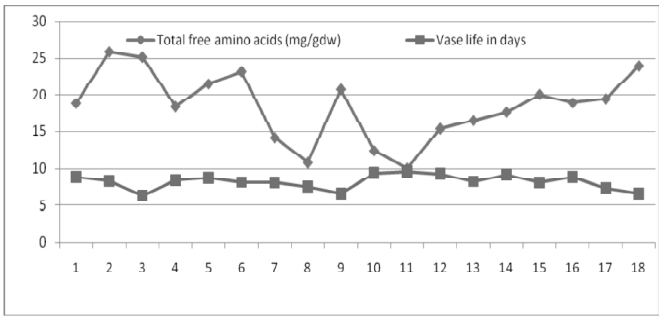

Figure 2: The relationship between Total free amino acids (mg/gdw) and vase life

Table 2
Effect of micronutrients at different concentrations on Total sugars, Total free amino acids and vase life parameters of Rose cv. Sophia Loren

Tr No.	*Treatments*	*Total sugars (mg/gfw)*	*Total free amino acids (mg/gdw)*	*Vase life in days*
T_1	$MgSO_4$ 0.5%	3.577	18.82	8.80
T_2	$MgSO_4$ 1.0%	3.516	25.82	8.33
T_3	$MgSO_4$ 1.5%	2.969	25.11	6.29
T_4	$MnSO_4$ 0.5%	3.733	18.36	8.44
T_5	$MnSO_4$ 1.0%	3.454	21.46	8.76
T_6	$MnSO_4$ 1.5%	2.379	23.16	8.17
T_7	$FeSO_4$ 1.0%	3.084	14.10	8.16
T_8	$FeSO_4$ 1.5%	2.863	10.75	7.55
T_9	$FeSO_4$ 2.0%	4.291	20.70	6.61
T_{10}	Boric acid 0.25%	4.310	12.34	9.31
T_{11}	Boric acid 0.5%	6.083	9.97	9.56
T_{12}	Boric acid 0.75%	4.017	15.32	9.24
T_{13}	$ZnSO_4$ 0.5%	3.409	16.42	8.28
T_{14}	$ZnSO_4$ 0.75%	5.886	17.60	9.11
T_{15}	$ZnSO_4$ 1.0%	4.255	20.00	8.14
T_{16}	$CuSO_4$ 0.1%	2.638	18.88	8.86
T_{17}	$CuSO_4$ 0.3%	2.687	19.41	7.29
T_{18}	$CuSO_4$ 0.5%	3.038	23.92	6.57
T_{19}	Control *	3.450	37.52	4.27

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