INFLUENCE OF POTASSIUM ON GROWTH PARAMETERS AND YIELD OF GRAPES cv. MUSCAT

Dr. M. Rajkumar
Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalainagar-608 002.

ABSTRACT

An experiment was conducted to find out the "Influence of potassium on growth parameters and yield of grapes cv. Muscat". The potassium fertilizer was given as soil application and foliar spray in the form of sulphate of potash (SOP) along with normal dose of Nitrogen and Phosphorus at 0, 200, 400, 600, 800, 1000 grams per vine, and also (T_7) 600 grams + 0.5% of foliar spray, (T_8) 600grams + 1% of foliar spray application at pea and marble stage the treatment (T_8) potassium at 600gm was given as soil application was done to find the response of potash on grapes. The potassium as soil application along with 0.5% foliar spray shows the best results in leaf area index, total chlorophyll content, diameter of berries, length and width of bunch and yield of (27.37 t/ha).

INTRODUCTION

Grape (*Vitis vinifera*) is one of the most delicious, refreshing and nourishing subtropical fruits. The berries are a good source of minerals and vitamins (B_1, B_2 and C). The fruits are consumed in fresh forms as a table fruit and in the processed form as wine, raisin and fresh juice. In India, while 78 per cent of grape produced in used for table purposes, nearly 17-20 percent is dried for raisin production, while the remaining 2 percent is used for manufacturing of juice and wine. Grapes are grown in Punjab, Haryana, Maharastra, Karnataka

and Tamilnadu in the southern part of India. The popular grape varieties of South India are Muscat, Thompson Seedless, Anab-e-Shahi and Bangalore Blue.

Nutrient is one of most important aspect of crop production and acconts for 30 percent of the total cost cultivation. Balanced fertilization is the only way for enhancing the crop productivity in a sustainable manner (Lester et al., 2007). Nutrients influence on growth and yield of grapes through vigorous and healthy growth of vines during pre-initiation stage of floral primordial stage and slow growth during the fruit bud differentiation stages are favourable for productivity.

Potassium acts as a catalytic element for photosynthesis and protein synthesis. It is more needed for the growth of meristematic region, for formation of secondary roots and new emerging branches. It maintains proper C/N ratio, play a vital role in uptake of nutrients as Ca, N, P etc., Potassium has direct role on photosynthesis, meristematic growth, chlorophyll synthesis, increase disease resistance in plant and improves quality of grapes (Singh et al., 2005).

Fertilizer offers the best means of increasing yield and maintaining soil fertility. The main major nutrients N, P_2O_5 and K_2O are essential for higher yield of any crop (Shikhamany, 1982). Potassium sulphate has an important role in grape cultivation, as it recommended as high as 800 kg K_2O / ha. Keeping these facts in view, a comprehensive study of soil and petiole analysis of grape gardens in Surulipatti village of Theni district was undertaken to study the effect of potassium on growth attributing characters of grapes and yield of Grapes.

MATERIALS AND METHODS

An investigation was carried out at Surulipatti village, near Theni district of Tamilnadu to study the “Influence of potassium on growth parameters and yield of grapes cv. Muscat”. The

experiment was laid out in Randomised Block Design (RBD) with three replication for each treatment. The growth parameters like leaf area index(cm^2), total chlorophyll content (mg g^{-1}), dry matter production (grams) and yield attributes like number of quality berries per bunch, number of berries per bunch, diameter of berries (cm), yield per hectare were recorded periodically.

DETAILS OF TREATMENT:

Treatment	**Levels of NPK composition (gm/vine)**			
	N	**P**	**K**	**Foliar spray of SOP**
T_1 Control	200	160	-	-
T_2	200	160	200	-
T_3	200	160	400	-
T_4	200	160	600	-
T_5	200	160	800	-
T_6	200	160	1000	-
T_7	200	160	600	+ 0.5% SOP foliar spray @ initial fruit setting period and 15 days after first spray.
T_8	200	160	600	+ 1% SOP foliar spray @ initial fruit setting period and 15 days after first spray.

RESULTS AND DISCUSSION

Various treatments significantly influenced on the leaf area index. The highest leaf area was recorded in the treatment (T_7) with the value of 264.43 cm^2. However it was followed by (T_8) which recorded 260.20 cm2. The lowest leaf area index was observed in (T_1) control as 235.01cm^2. Potassium ions play various roles in the translocation of assimilates, meristematic growth,

maintenance of the water regime of the plant, photosynthesis and the translocation of photosynthates (Mengel & Kirkby, 1987).

The highest chlorophyll content (1.98 mg g^{-1}) was observed in (T_8) followed by treatments (T_7) as 1.93mg-^{1} and the lowest chlorophyll content was recorded in the treatment(T_1) as 1.62 mg g^{-1}. The total chlorophyll content was high in the treatment (T_8) (600 gm/vine + 0.5% SOP as foliar spray at 1st week of fruit setting period and 2n^{d} on 15 days after first spray) has (2.03 mg/gm) highest leaf chlorophyll. Similar finding were also reported in Apple trees by (Shahin et al., 2010). Potassium also increases permeability of the cell wall which would allow greater amount of water and dissolve nutrients to intercellular region and significant increase in chlorophyll (Heyn, 1993). The reasons behind this may be due to the physiological role of potassium in stimulation of enzymes responsible for carbohydrate synthesis and energy production, so physiological and nutritional status of plant will improve. Hence, potassium was found to be a regulator in closing and opening of stomata (Ashley et al., 2006).

The highest dry matter content was observed in the (T8) (32.40%) followed by the treatment (T7) as (31.91%) and the lowest dry matter production was recorded in control (T1) as (29.02 %). This result was in line with the reports of Sekarappa (1994). He showed that the application of potash in the form of K_2SO_4 increase dry matter and Sheheta and El (1976) also revealed that increased levels of potash reflects on the dry matter production of fruits and vegetative parts. It was also in consonance with the report of KR- Steva-Kostova, (1975).

The maximum number of quality berries as 121.81 was recorded in the treatment (T_7) and followed by (T_8) as (116.39). The minimum number of quality berries per bunch was recorded in the treatment (T_1) as (83.70).

The maximum number of bunches (26.08) were observed in (T_7) was followed by (T_8) with 26.01 bunches in the present experiment was in accordance with the report of Srinivasan (1968). He noted the application of potash fertilizer singly resulted in the advanced bud development and hence the number of bunches seems to be increased on Anab-e-shahi grapes. Similar observation was earlier reported by Sekarappa in 1994, with the application of various potassium fertilizers and concluded that the SOP is better performing than theother sources. The results were in conformity with those obtained by Jeetram et al., (1993) and Suleman et al., (1993).

The minimum number of shot berries retained in the treatment (T_7) may be due to the nutrients accumulation in stalk of grape berries and good absorption of potash by means of foliar application on growth stage of inflorescence, uptake of nutrients is more at this stage in grapes. This is in agreement with the findings of Bhargava and Raghupathi (1999).

The diameter of berries seems to be increased in the treatment (T_7). It may be due to foliar application of potash at anthesis and development stage results in good absorption of potash nutrient spray at the flowering period shows the best result on increasing the berry diameter by pulp content in the grape berry. Potassium ions are involved in the activation of more than 60 enzymes, and are important for cell division for pulp content and starch and protein synthesis (Lindhauer, 1986).

Highest yield of 27.37 tons/ha was obtained in (T_7) similar findings also reported by Abdelal et al, 1978. It may be due to the reason that enhances the chlorophyll, which is essential to perform the photosynthetic process and also important for the normal metabolic pathway in the plant cells for boosting the yield of fruits crops. (Salem et al., 2007).

CONCLUSION

From the above study among the various trestments the plants treated with potassium 600 gm as soil application along with 0.5% foliar spray of SOP showed the best result in vegetative characters such as leaf area index, total chlorophyll, dry matter production and yield.

Treatment	**Level of fertilizer composition (g/vine)**			**Number of quality berries bunch^{-1}**	**Number of shot berries bunch^{-1}**
	N	**P**	**K**		
T_1	200	160	-control-	83.70	24.62
T_2	200	160	200	89.20	22.86
T_3	200	160	400	94.69	21.16
T_4	200	160	600	100.13	19.36
T_5	200	160	800	110.80	17.38
T_6	200	160	1000	105.55	15.82
T_7	200	160	600 + 0.5% foliar spray of SOP	121.81	13.06
T_8	200	160	600 + 1% foliar spray of SOP	116.39	14.06
SE(d)				2.25	0.49
CD (p=0.05)				4.5	0.98

Treatment	**Level of fertilizer composition (g/vine)**			**Number of bunches vine-1**	**Yield vine-1 (kg)**
	N	**P**	**K**		
T_1	200	160	-control-	30.76	30.95
T_2	200	160	200	31.72	32.40

T_3	200	160	400	32.68	35.25
T_4	200	160	600	34.63	33.70
T_5	200	160	800	35.59	38.20
T_6	200	160	1000	33.67	36.65
T_7	200	160	600 + 0.5% foliar spray of SOP	36.55	41.10
T_8	200	160	600 + 1% foliar spray of SOP	37.51	39.80
SE(d)				0.75	0.575
CD (p=0.05)				0.37	1.15

Treatment	**Level of fertilizer composition (g/vine)**			**Leaf area index(cm^2)**	**Total chlorophyll content(mg/g)**	**Dry matter production(g)**
	N	**P**	**K**			
T_1	200	160	-Control-	235.01	1.60	29.02
T_2	200	160	200	239.01	1.67	29.50
T_3	200	160	400	243.01	1.72	30.47
T_4	200	160	600	247.60	1.78	30.65
T_5	200	160	800	256.01	1.87	30.95
T_6	200	160	1000	251.83	1.89	31.43
T_7	200	160	600 + 0.5% foliar spray of SOP	264.43	1.96	31.91
T_8	200	160	600 + 1% foliar spray of SOP	260.20	1.98	32.40
SE(d)				1.25	0.018	0.172
CD(p=0.05)				2.5	0.036	0.375

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