Short communication

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Chemical management of broad-leaved weeds in grapes

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Grape (*Vitis vinifera* L.) is one of the most important fruit crops of temperate zone, which has acclimatized to sub tropical and tropical agro climatic conditions prevailing in the Indian sub-continent. In India, grapes are grown under different soil and cultural conditions. Weed flora varies according to the climate and physio-chemical properties of the soil. rrespective of the agro climatic conditions, *Parthenium hysterophorus, Cynodon dactylon Cyperus rotundus* are the common weeds in the Indian vineyards although as many as 378 species of weeds have been reported to infest the cultivated lands in Karnataka (Krishna Sastry *et al.* 1980). The weed flora also differ with the training and irrigation system of the vineyards. The variety of weeds and their intensity is more in vineyards where vines are trained to vertical trellises such as T, V, Y or tatura due to availability of uninterrupted sunlight. Under drip-irrigation system, weeds grow mainly in the wetted area particularly during summer (Patil 2005).

In the past, majority of workers have tried either pre-emergence or post-emergence application of weedicides for the control of weeds in the grape vineyard. No single weedicide either as pre-emergence or post-emergence can offer a long lasting control of weeds in vineyards since grape vines are irrigated and the soil moisture is maintained throughout the year, which helps the weeds to grow almost throughout the year. Keeping all these aspects in mind, the present investigations was undertaken.

A field experiment was conducted on grape (*Vitis vinifera* L. (cv *Thompson Seedless*) at the vineyard of the National Research Centre for Grapes, Pune (latitude 18.31 N, longitude 73.55 E) after October pruning of 2010. The trial was laid out in randomized complete block design, having ten treatments with three replications, to test the effect of various treatments for controlling weeds in the vineyards under tropical conditions of Pune, Maharashtra. The vines selected were spaced at 2.4 m between rows and 1.2 m within rows. The plot size was 4.8 x 4.8 m accommodating eight vines in each treatment. Irrigation and fertilizer requirements were kept as per standard recommendation.

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Herbicides were applied at 3 to 4 leaf stage of weed in vineyard. Hand weeding was also done along with weedicides application. The treatments details are given Table 2.

Weeds were counted by taking a quadrate of 0.5 x 0.5 m placed at random inside the each treated plot. The total number of dicot and monocot weeds present (Table 2) in the quadrate frame was counted at 15 and 30 days after treatment. The weed count per square meter was then worked out. The sum of all weeds was recorded as total weed count per square meter.

For dry weight, above ground portion of the weeds in the quadrant was collected from each plot at 15 days and 30 days after treatment. The weed samples were air-dried and later oven dried to constant weight at 60 ^{o}C and dry weight was recorded. These dry weights were converted to dry weight per square meter.

Grape yield per hector basis was calculated based on bunch weight at the time of crop harvest. Bunch weight calculated from collecting random five bunches from eight vines from each treatment while, the yield of five vines in each treatment was recorded and average yield per hectare was calculated and expressed in tones. All parameters studied showed high degree of variation. Therefore, data was subjected to square-root transformation to make the analysis of variance valid.

The dominant weed flora was *Parthenium hysterophorus, Cyperus rotundus* L., *Euphorbia geniculata* L., *Portulaca oleracea* L., *Commelina benghalensis* L. and *Amaranthus spinosus* L.

Herbicides treatments in grape vineyard significantly reduced the total number of weeds.The results revealed significant effect of different weed control treatments on weed population. Lowest weed density (12.2/m^2) after 15 days of application was observed in glyphosate (42% SL) followed by BCSAA 10717 (2%) + glphosate (42% SC) and BCSAA 10717-2% + glphyosate 4% SC. However, after 30 days after spraying of weedicides, highest weed control was observed with lowest weed density (4.80/m^2)

Table 1. Effect of herbicide on weed density (no./m^2) in vineyard at 15 days after treatment application

Treatment	Dosage		Weed count (no./m^2)						
	g/ha	Volume (ml)	P.h.	E.g.	A.s.	C.b.	C.r.	Other grasses	Total
T_1 - Untreated control (weed check)	Untreated	--	40(6.4)	26 (5.2)	14 (3.8)	21 (4.7)	97 (9.9)	9 (3.2)	207 (14.4)
T_2 - BCSAA 10171-2% + glyphosate 40-42% SC	32.5+650	1625	12(3.6)	15 (0.4)	11 (3.5)	17 (4.2)	120 (11.0)	10 (3.3)	185(13.6)
T_3 - BCSAA 10171-2% + glyphosate 40-42% SC	37.5+750	1875	7(2.8)	18 (4.4)	13 (3.7)	23 (4.9)	80 (9.0)	19 (4.5)	160(12.7)
T_4 - BCSAA 10171-2% + glyphosate 40-42% SC	42.5+850	2125	33(5.8)	7 (2.8)	22 (4.8)	30 (5.6)	134 (11.6)	21 (4.7)	247(15.8)
T_5 - BCSAA 10171-2% + glyphosate 40-42% SC	85.0+1700	4250	22(4.8)	5 (2.5)	13 (3.7)	10 (3.3)	103 (10.2)	7 (2.8)	160(12.7)
T_6 - BCS AA 10717 SC 500	42.5	85	28(5.4)	15 (0.4)	8 (3.0)	22 (4.8)	87 (9.4)	4 (2.2)	164(12.9)
T_7 - Glyphosate 42 SL	850	2073	55(7.5)	22 (4.8)	13 (3.7)	12 (3.6)	39 (6.3)	8 (3.0)	149(12.3)
T_8 - Glyphosate 41 SL	1025	2500	72(8.5)	38 (6.2)	27 (5.3)	12 (3.6)	67 (8.3)	19 (4.5)	235(15.4)
T_9 - Paraquat 24 SL	600	2500	34(5.9)	18 (4.4)	21 (4.7)	11 (3.5)	89 (9.5)	15(4.0)	188(13.8)
T_{10} - Hand weeding	Hand weeded	-	135(11.7)	13 (3.7)	13 (3.7)	8 (3.0)	94 (9.8)	3(2.0)	266(16.3)
LSD (P=0.05)			6.67	1.95	1.13	1.20	4.16	1.21	0.39

P.h. - *Parthenium hysterophorus*, C.r. -*Cyperus rotundus*, E.g. - *Euphorbia genieculata*, C.b. - *Commelina benghalensis*, A.s. - *Amaranthus spinosus*

Table 2. Effect of herbicides on density in vineyard at 30 days after treatment

Treatment	Dosage		Weed count (no/m^2)						
	g/ha	Volume (ml)	P.h.	E.g.	A.s.	C.b.	C.r.	Other grasses	Total
T_1	Untreated	-	40(6.4)	26(5.2)	14(3.9)	21(4.7)	97(9.9)	9(3.2)	207(14.4)
T_2	32.5+650	1625	12(3.6)	15(4.0)	11(3.5)	17(4.2)	120(11.0)	10(3.3)	185(13.6)
T_3	37.5+750	1875	7(2.8)	0 (1.0)	0(1.0)	23(4.9)	80(9.0)	0(1.0)	110(10.5)
T_4	42.5+850	2125	0(1.0)	0(1.0)	0(1.0)	30(5.6)	134(11.6)	0(1.0)	164(12.9)
T_5	85.0+1700	4250	22(4.8)	0(1.0)	0(1.0)	0(1.0)	0(1.0)	0(1.0)	22(4.8)
T_6	42.5	85	28(5.4)	15(4.0)	8(3.0)	22(4.8)	87(9.3)	0(1.0)	160(12.7)
T_7	850	2073	55(7.5)	22(4.8)	13(3.7)	12(3.6)	39(6.3)	0(1.0)	141(11.9)
T_8	1025	2500	72 (8.5)	0(1.0)	27(5.3)	0(1.0)	67(8.3)	0(1.0)	166(12.9)
T_9	600	2500	34(5.9)	0(1.0)	21(4.7)	0(1.0)	89(9.5)	0(1.0)	144(12.0)
T_{10}	Hand weeded	-	135(11.7)	13(3.7)	13(3.7)	8(3.0)	94(9.8)	3(2.0)	266(16.3)
LSD (P=0.05)			7.0	1.6	1.6	1.8	6.1	0.6	0.39

P.h. - *Parthenium hysterophorus*, C.r. - *Cyperus rotundus*, E.g. - *Euphorbia geneculata*, C.b. - *Commelina benghalensis*, A.s. - *Amaranthus spinosus* L.

in BCSAA 10717-2% + glyphosate (42% SC) treated plote than rest of the weedicide (Table 2 and 3). This might be due to the persistence of glyphosate for a long period. Similar results were observed by Gaziev *et al.* (1985) who showed that glyphosate persisted in soil for 3 to 5 months under rainfed conditions and 3 months in irrigated conditions.

After 30 days of spraying, highest weed density was occurred in hand weeding treatment which was in contrast with findings of Rekha *et al.* (2002) and Hussain *et al.* (2008). The studies are in confirmation with the earlier works by Bajwa *et al.* (1990) and Bajwa *et al.* (1992), who reported glyphosate as very effective for controlling both mono and dicot weeds in grapes.

Application of glyphosate with other weedicides treatment in '*Thompson Seedless'* grape vineyard significantly reduced the dry weight in all weeds both at 15 and 30 days as compared to hand weeding and control. BCSAA 10717-2% + glyphosate 42% SC showed its superiority by recording lower dry weight of weeds as compared to other post-emergent herbicides like BCSAA**,** glyphosate and paraquat (Fig. 1). Similar results were obtained by Bajwa *et al.*, (1993b) and Muniyappa and Prathibha *et al.* (1993).

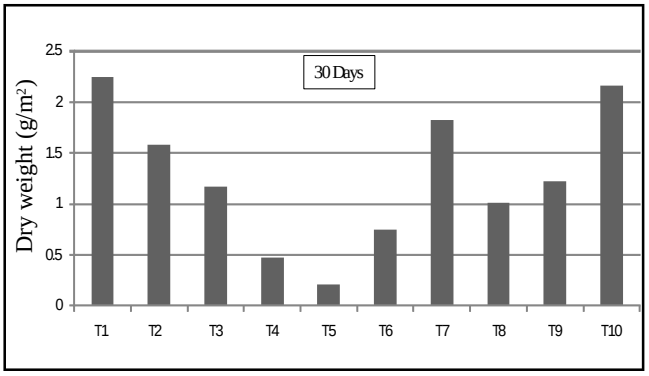

Fig. 1. Effect of weed control treatment on dry weight (g/m^2) of total weeds in vineyard at 30 days after treatment

Table 3. Effect of weed control treatments on bunch weight and yield of grapes

Treatment	Dosage		Bunch weight (g)	Yield (t/ha)
	g/ha	Volume (ml/ha)		
T_1	Untreated	-	233	20.5
T_2	32.5+650	1625	245	26.6
T_3	37.5+750	1875	269	29.0
T_4	42.5+850	2125	270	24.0
T_5	85.0+1700	4250	244	28.2
T_6	42.5	85	280	29.6
T_7	850	2073	260	30.8
T_8	1025	2500	246	15.3
T_9	600	2500	218	32.1
T_{10}	Hand weeded	-	260	23.1
LSD (P=0.05)			8	1.01

The application of BCSAA 10717-500 SC (T_6) showed lowest dry weight (0.847 g/m^2) followed by BCSAA 10717 2% + glyphosate 42% SC (1.238 g/m^2) and then BCSAA 10717 2% + glyphosate 42.5 SC (1.503 g/m^2) after 15 days of application of weedicides. While after 30 days, the application of BCSAA 10717 2% + glyphosate 42% SC showed lowest dry weight followed by BCSAA 10717 2% + glyphosate 42% SC as compared to untreated, hand weeding and other weedicide treatments. These results are in conformity with results of Aulakh (1999).

The data on bunch weight and yield depicted that all the treatments showed significant effects on grape yield (Table 3). Weed control treatments with or without herbicides significantly increased the number of bunches per vine as compared to hand weed check. The bunch weight was higher where BCSAA 10717-500 SC was used for weed control, followed by BCSAA 10717-2% + glyphosate 42% SC. Similar results were observed by Yamadagni and Sharma (1992) who reported that, application of diuron at 2 and 3 kg/ha increased the bunch weight as compared to weed free and weedy check. Least bunch weight was recorded in control (weed check) (T_1).

Maximum yield (32.12 t/ha) was produced in paraquat 24 SL weedicide treatment followed by glyphosate 42 SL treatment. Increase in yield in weedicidal treatments and hand weeding might be due to increase in yield components resulting from weedy check of weeds and shifting of competition of moisture and nutrients in favor of crop. Increase yield by the application of weedicides has been reported by Bajwa *et al. (*1993b) and Bajwa *et al.* (1997)

No phytotoxic signs or symptoms, *viz*. leaf tip/surface injury, wilting, vein clearing, necrosis, epinasty or hyponasty were observed at 1, 3, 5, 7, 10, 15 and 30 days after reatment with tested herbicide. Present study recommended the use of BCSAA 10717 2% + glyphosate 42% SC at the rate of 85.0 + 1700 g/ha or glyphosate 42% SL at the rate of 850 g/ha which seems to be economical and long lasting effects for weed control.

SUMMARY

A field experiment was conducted to study the effect of different herbicides alone or in combination, *viz*. BCSAA 10717-2% + glyphosate (42% SC), BCSAA10717-500 (SC), It is glyphosate (42% SC), glyphosate (41% SC) and paraquat(24 SL) for management of annual and perennial broad-leaved weeds in grapes after October pruning of the year 2010-2011. Herbicide treatments in grape vineyard significantly reduced the total number of weed. Among the tested herbicides, the most effective weed control was recorded with BCSAA 10717 (2%) + glyphosate 42% SC (85.0 + 1700 g/ha) which showed lowest weed density of 22 (4.80) plants/m^2 and lowest dry weight (0.212 g) of weed after 30 days. While paraquat (24 SL) found effective in increasing the yield with decreasing competition between grape vine and weed, The highest yield (32.12 t/ha) was found in area where paraquat 24 SL was used for

weed control. No phytotoxic signs or symptoms, *viz.* leaf tip/surface injury, wilting, vein clearing, necrosis, epinasty and /or hyponasty were observed by weed management treatments.

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